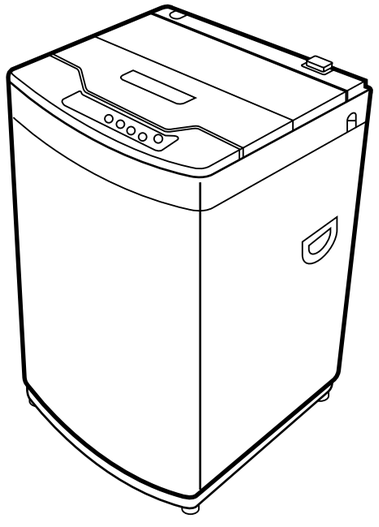
Service Manual

Full-Auto Electric Washing Machine

DWF-4220 (Series)
DWF-5020 (Series)



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DAEWOO

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1. SPECIFICATIONS

NO	ITEM		SPECIFICATIONS				
1	POWER SOURCE		AC 220V/60Hz	AC 127V/50,60Hz	AC 110V/60Hz	AC 220V/50Hz	AC 240V/50Hz
2	POWER CONSUMPTION	DWF-4220	370W	370W	370W	330W	330W
		DWF-5020	430W	430W	430W	370W	370W
3	MACHINE WEIGHT	DWF-4220	NON PUMP: NET; 30.5kg, GROSS: 35 kg PUMP: NET; 31.5kg, GROSS; 36kg				
		DWF-5020	NON PUMP: NET; 31.5kg, GROSS: 36 kg PUMP: NET; 32.5kg, GROSS; 37kg				
4	DIMENSION (WXHXD)		502X820X500				
5	WASHING COURSE		FULL AUTOMATIC 4 COURSES (FUZZY, SPEED, HEAVY, WOOL)				
6	WATER CONSUMPTION		NORMAL 128ℓ (131ℓ: DWF-5020)				
7	WATER LEVEL SELECTOR	DWF-4220	HIGH (47ℓ), MEDIUM (38ℓ), LOW (30ℓ), SMALL(22ℓ)				
		DWF-5020	HIGH (48ℓ), MEDIUM (39ℓ), LOW (31ℓ), SMALL(23ℓ)				
8	OPERATING WATER PRESSURE		0.3~8kgf/cm^2 (2.9~78.4N/cm^2)				
9	REVOLUTION PER MINUTE		SPIN: 750 WASH: 140	SPIN:690 (50Hz) WASH:130 SPIN: 750 (60Hz) WASH: 140	SPIN: 750 WASH: 140	SPIN: 690 WASH: 130	
10	PULSATOR		5 WINGS (Ø 321mm)				
11	WATER LEVEL CONTROL		ELECTRONICAL SENSOR				
12	OUTER CABINET		SGCC				
13	GEAR MECHANISM ASS'Y		PLANETARY GEAR ASSEMBLY OF ENGINEERING PLASTIC				
14	LINT FILTER		O				
15	SOFTENER INLET		O				
16	ALARM SIGNAL		O				
17	AUTO WATER SUPPLY		O				
18	NEW WATER FLOW		WATER FLOW FOR ADJUST THE UNBALANCED LOAD				
19	FUNCTION FOR BUBBLE		OPTION				
20	MAXIMUM MASS OF TEXTILE	DWF-4220	4.2 kg				
		DWF-5020	5.0 kg				

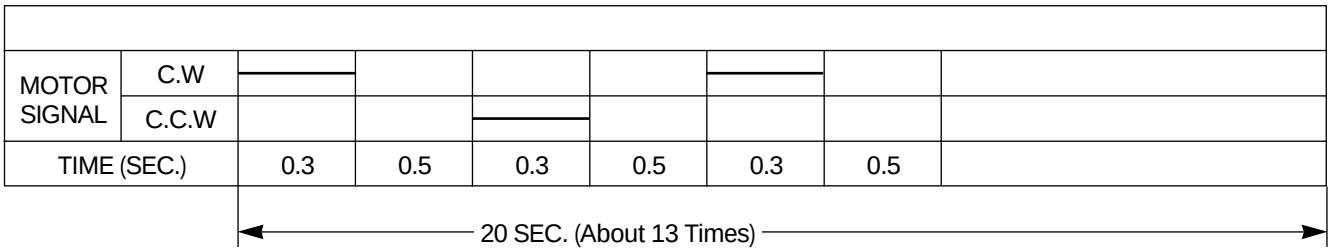
2. FEATURE AND TECHNICAL EXPLANATION

FEATURE OF THE WASHING MACHINE

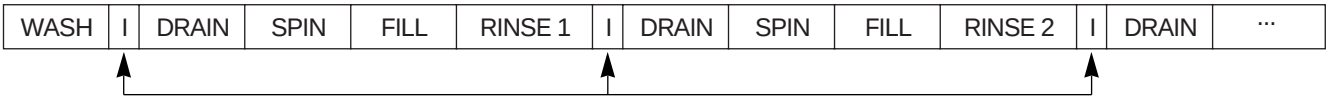
1) The first air bubble washing system in the world.
2) Quiet washing through the innovational low-noise design.
3) The wash effectiveness is much more enhanced because of the air bubble washing system.
4) The laundry detergent dissolves well in water because of the air bubble washing system.
5) The adoption of the water currents to adjust the unbalanced load.
6) One-touch operation system.

WATER CURRENTS TO ADJUST THE UNBALANCED LOAD

It is a function to prevent eccentricity of the clothes after washing by rotating pulsator C.W and C.C.W for 20 seconds.



WATER FLOW



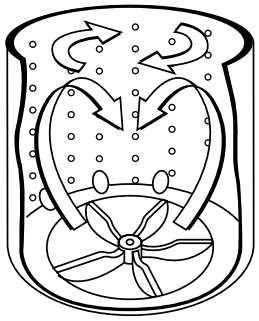
NOTE: "I" mark indicates the operation of the water currents to adjust the unbalance load.

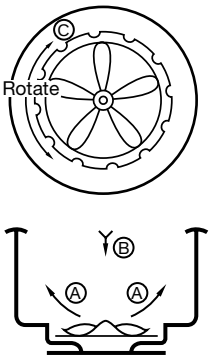
EFFECT

It reduces vibration and noise effectively during spinning.

PULSATOR SYSTEM

When the new shaped pulsator is rotated C.W or C.C.W at a high speed, it makes the 'heart-shaped' water currents as shown below.





WATER CURRENTS

A Water is pushed up near the tub wall by rotation of the pulsator.

B Water is pulled down in the middle of the tub by rotation of the pulsator

C Water currents is generated by rotation of the pulsator.

AUTOMATIC DRAINING TIME ADJUSTMENT

This system adjusts the draining time automatically according to the draining condition.

Draining condition	Good draining	The washer begins spin process after drainage.
	Bad draining	Draining time is prolonged.
	No draining	Program stops and gives the alarm.

FUNCTIONAL PRINCIPLE

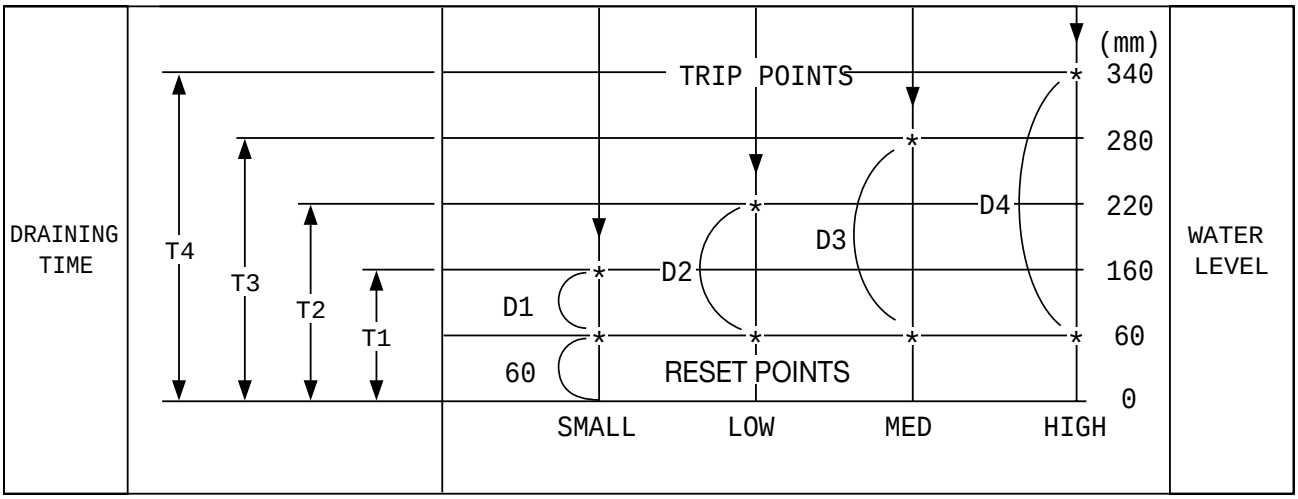
1. The micom can remember the time from the beginning of drain to reset point when the pressure switch reaches to "OFF" point.

Drain Time	Movement of the Program
Less than 5 minutes	Continue draining.
More than 5 minutes	Program stops and gives the alarm with all lamps of the "COURSE" light up.

2. In case of continuous draining, residual drain time is determined by micom.

Draining time as a whole=D + 60
(T sec.)

- 60 — Residual drain time.
- D — The time remembered by micom.



T1=D1+60 (Sec.) T2=D2+60 (Sec.) T3=D3+60 (Sec.) T4=D4+60 (Sec.)

SOFTENER DISPENSER

This is the device to dispense the softener automatically by centrifugal force.
This is installed inside the Balancer Ass'y.

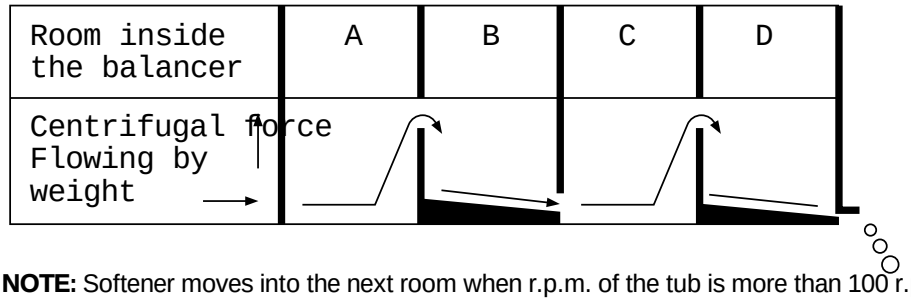
FUNCTIONAL PRINCIPLE

1. Softener stays in room (A) when poured into softener inlet.
2. Softener in moved from (A) to (B) by centrifugal force during intermittent spin process.
3. Softener flows from (B) to (C) during rinse process next to intermittent spin.
4. Softener in moved from (C) to (D) by centrifugal force during second intermittent spin.
   After spin process is finished, the softener is added into the tub through softener outlet.

FLOW OF THE SOFTENER

	Wash	**Intermittent Spin**	**Hold**	**Intermittent Spin**	**Rinse**	**Spin**
Normal Course	Centrifugal force (A) → (B)		Flow in (C)	Centrifugal force (D)	Flow in →	

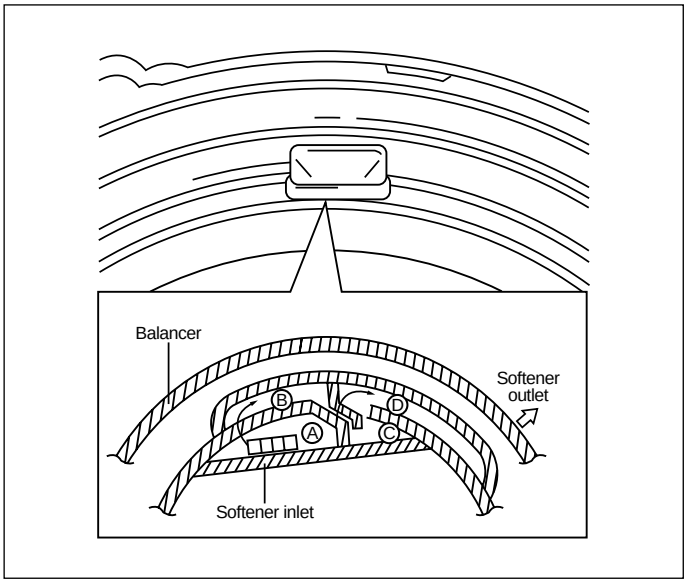
FLOW OF THE SOFTENER INSIDE OF THE BALANCER



NOTE: Softener moves into the next room when r.p.m. of the tub is more than 100 r.p.m.

HOW TO CHECK MOVEMENT

Pour a reasonable amount of "MILK" into softener dispenser and operate the washer with no load. In final rinse cycle, make sure that the milk is added into the tub through softener outlet.

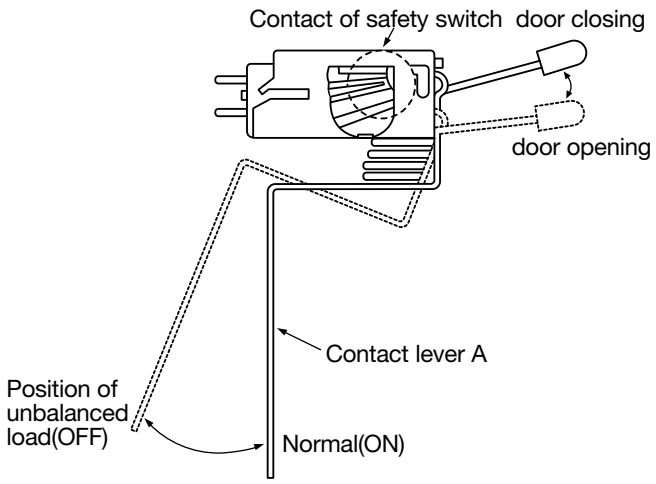


AUTOMATIC UNBALANCE ADJUSTMENT

This system is to prevent abnormal vibration during intermittent spin and spin process.

FUNCTIONAL PRINCIPLE

1. When the door is closed, the safety switch contact is "ON" position.
2. In case that wash loads get uneven during spin, the outer tub hits the safety switch due to the serious vibration, and the spin process is interrupted.
3. In case that P.C.B. ASS'Y gets "OFF" signal from the safety switch, spin process are stopped and rinse process is started automatically by P.C.B. ASS'Y.
4. If the safety switch is operated due to the unbalance of the tub, the program is stopped and the alarm is given.

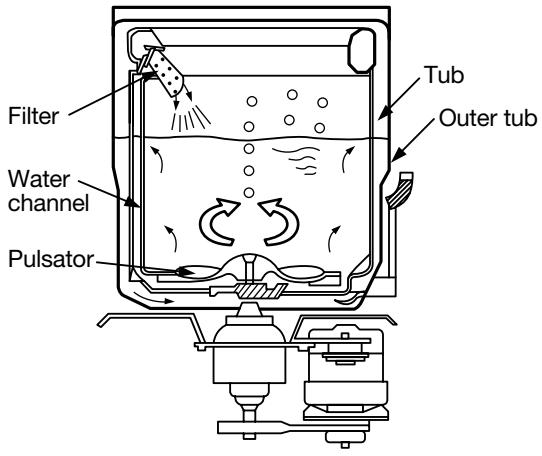


NOTE:
The alarm finished when you close the door after opening it. Check the unbalance of the wash load and the installation condition.

CIRCULATING-WATER COURSE AND LINT FILTER

CIRCULATING-WATER

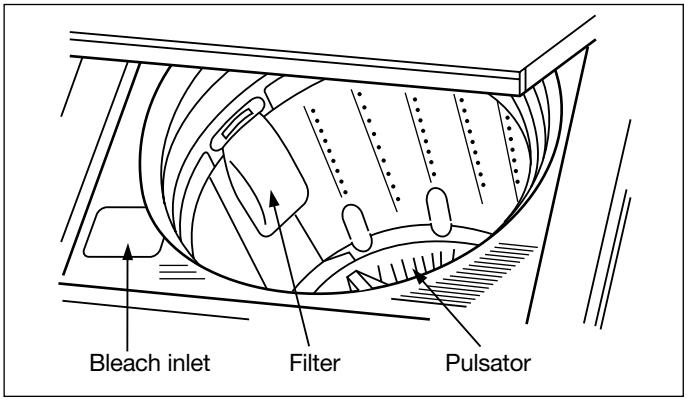
The washing and rinsing effects have been improved by adopting the water system in which water in the tub is circulated in a designed pattern.
When the pulsator rotates during the washing or rinsing process, the water below the pulsator vane creates a water currents as shown in figure.



LINT FILTER

Much lint may be obtained according to the kind of clothes to be washed and some of the lint may also stick to the clothes.

To minimize this possibility a lint filter is provided on the upper part of the tub to filter the wash water as it is discharged from the water channel. It is good to use the lint filter during washing.

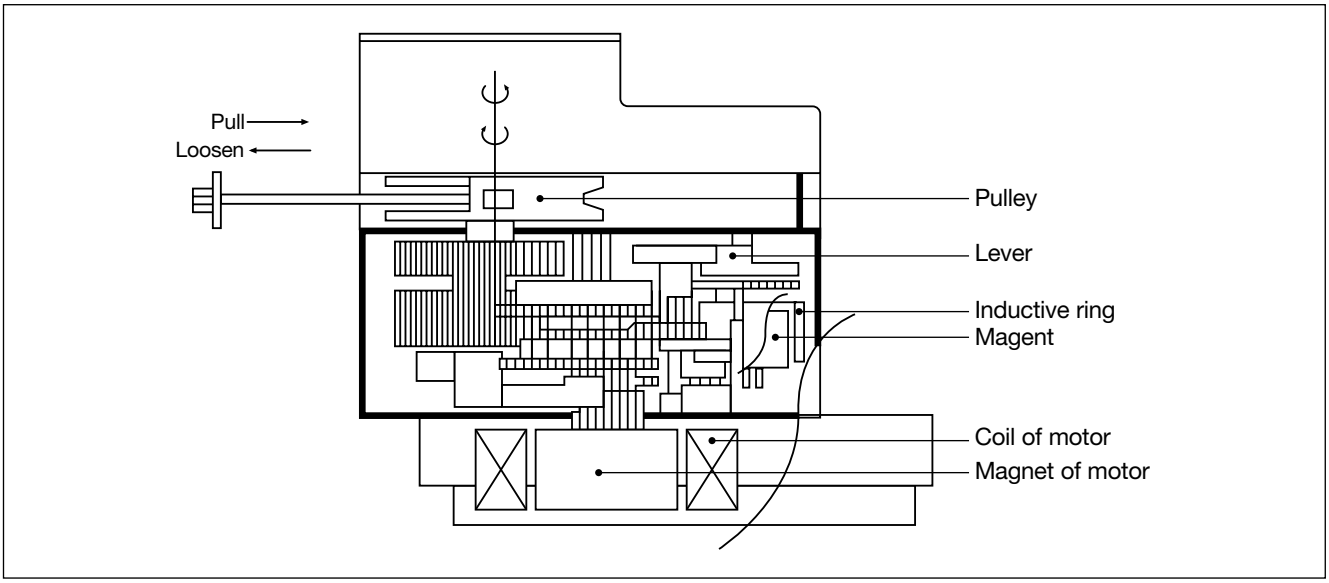


HOW TO CLEAN THE LINT FILTER

1. Pull the filter frame upward.
2. Turn the lint filter inside out, and wash the lint off with water.
3. Return the filter as it was, and fix the filter frame to the slot.

SYNCRONOUS MOTOR

STRUCTURE

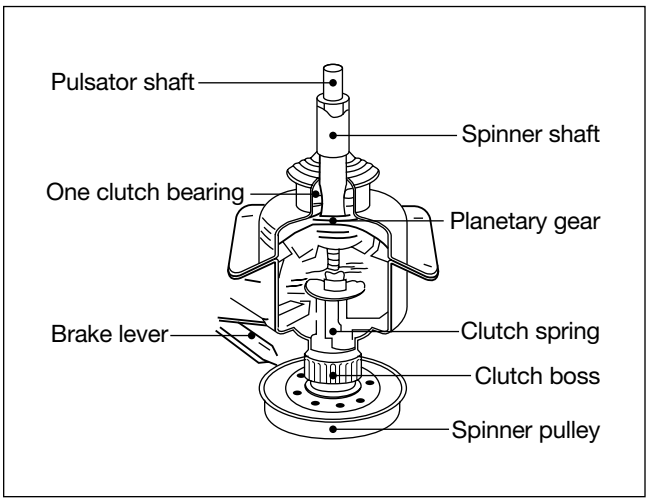


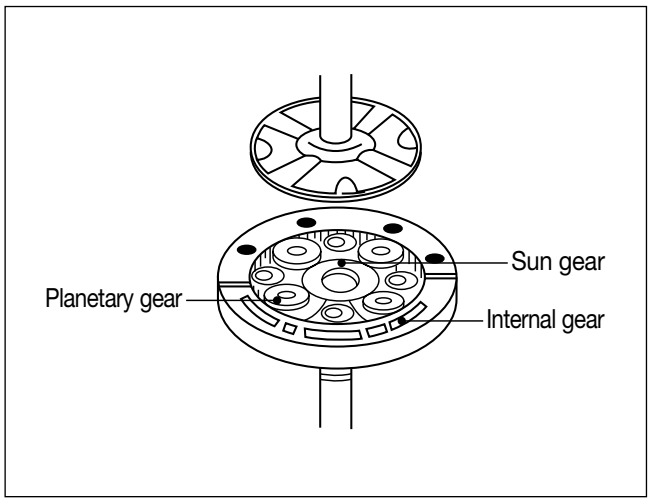
FUNCTIONAL PRINCIPLE

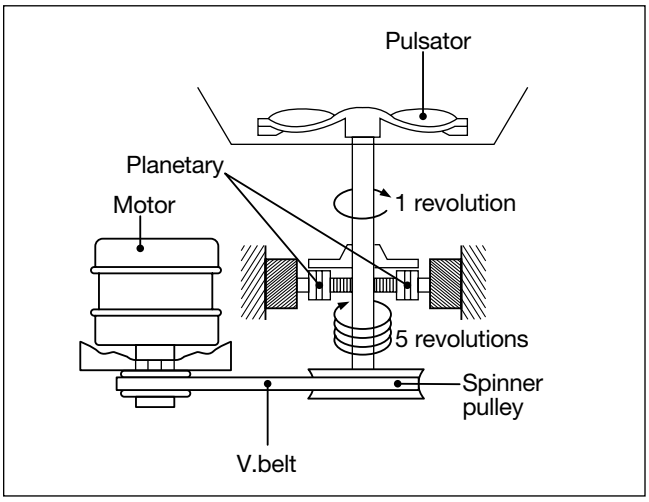
1. When the SYNCRONOUS MOTOR connected to the power source the SYNCRONOUS MOTOR rotates and revolves the pulley by gear assembly for reducing.
2. When the pulley is rotated, the pulley winds the wire to open the drain valve.
3. Therefore, rotation of pulley is changed to the linear moving of wire.
4. The wire pulls the brake lever of Gear Mechanism Ass'y within 5 seconds.
5. After the wire pulled, gear assembly is separated from motor and condition of pulling is held by operation of the lever.
6. When the power is turned off, the drain valve is closed because the wire returns to original position.

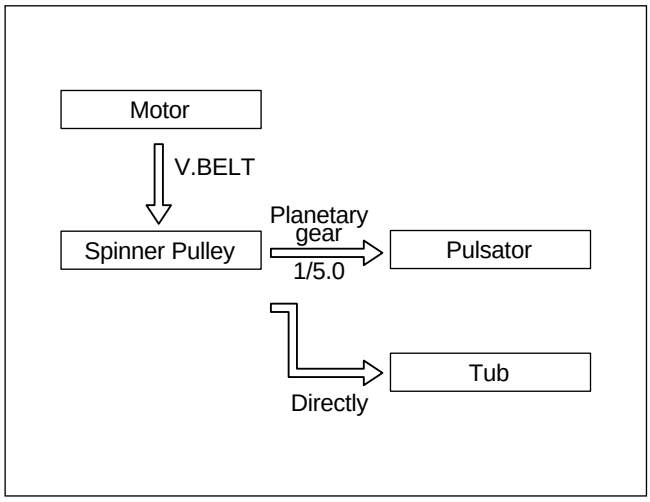
GEAR MECHANISM ASS'Y

The proper water currents is made by the rotation of pulsator at a low speed to prevent the damage to the small sized clothes.



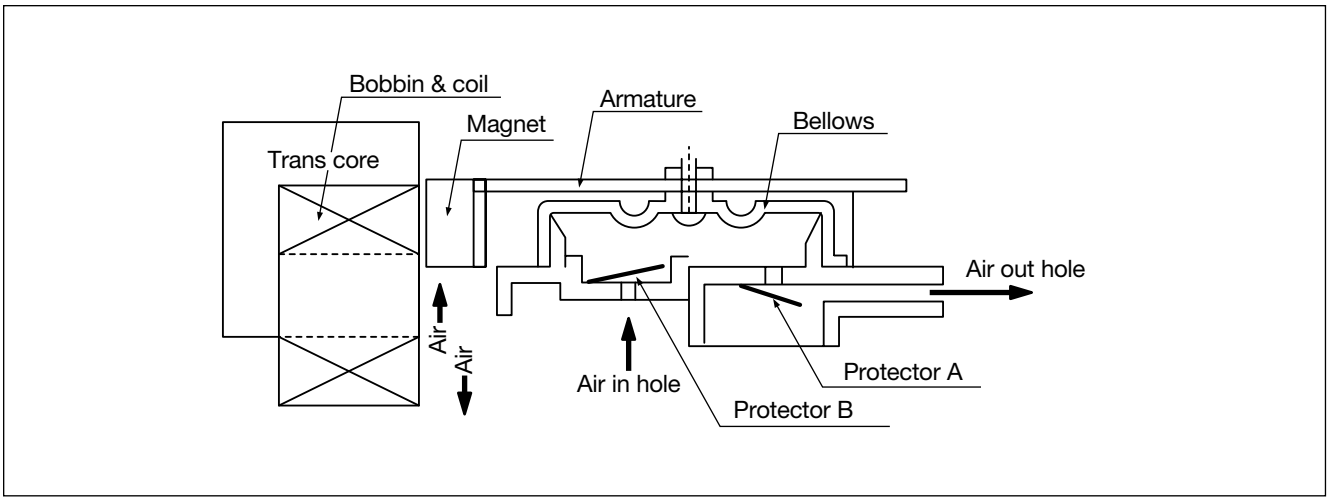






PRINCIPLE OF BUBBLE GENERATOR

STRUCTURE

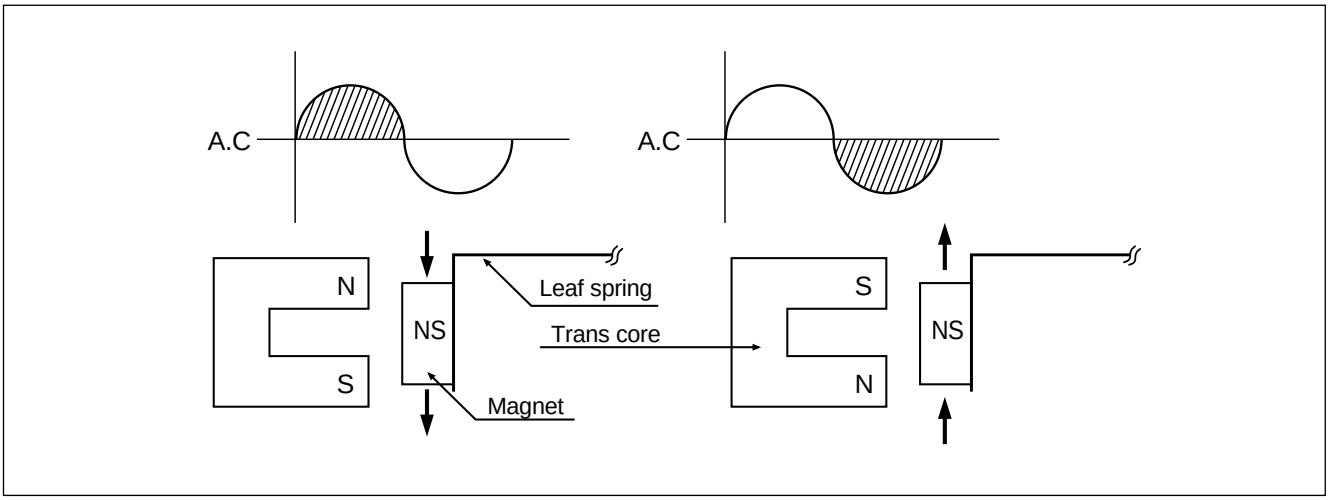


PRINCIPLE OF INTAKE & OUTLET OF THE AIR

INTAKE : ARMATURE moves up, and BELLOWS inhales the air. At the same time, protector B is open and A is close.
OUTLET: ARMATURE moves down, and BELLOWS exhausts the air. At the same time, protector B is close and A is open.

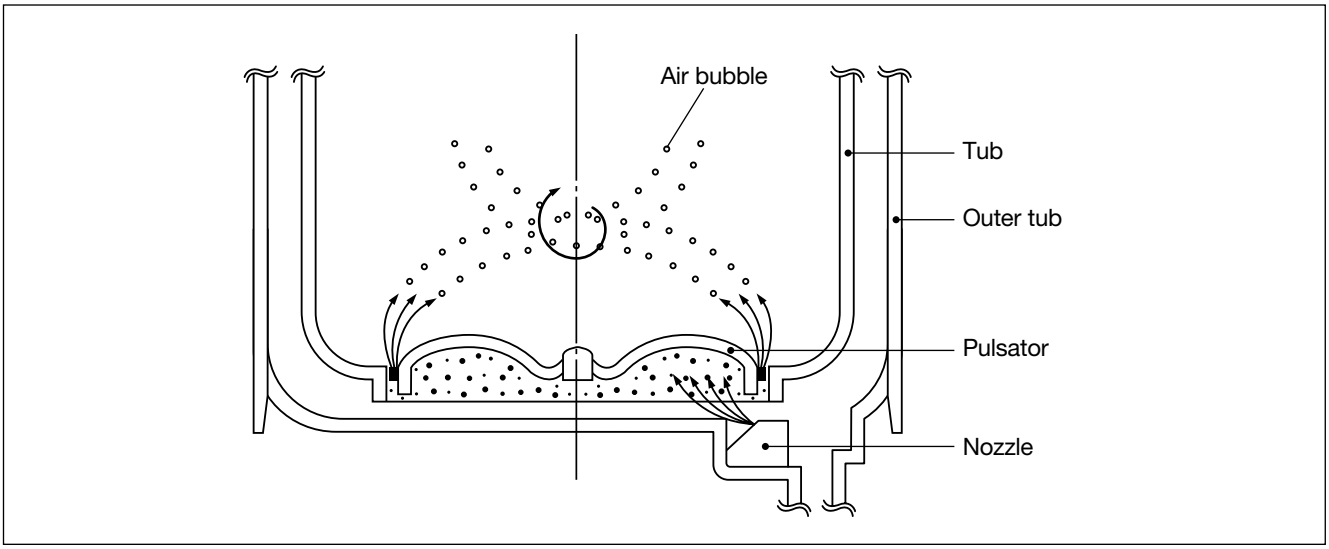
FUNCTIONAL PRINCIPLE OF TRANS & MAGNET

- The phase of A.C electric power changes to 60 cycle/second.
- The magnetic pole of trans core is changed by the change of the phase of A.C electric power.
- The core repeats push and pull (3600 times/min.) of the armature magnet.



FUNCTIONAL PRINCIPLE OF BUBBLE WASHING MACHINE

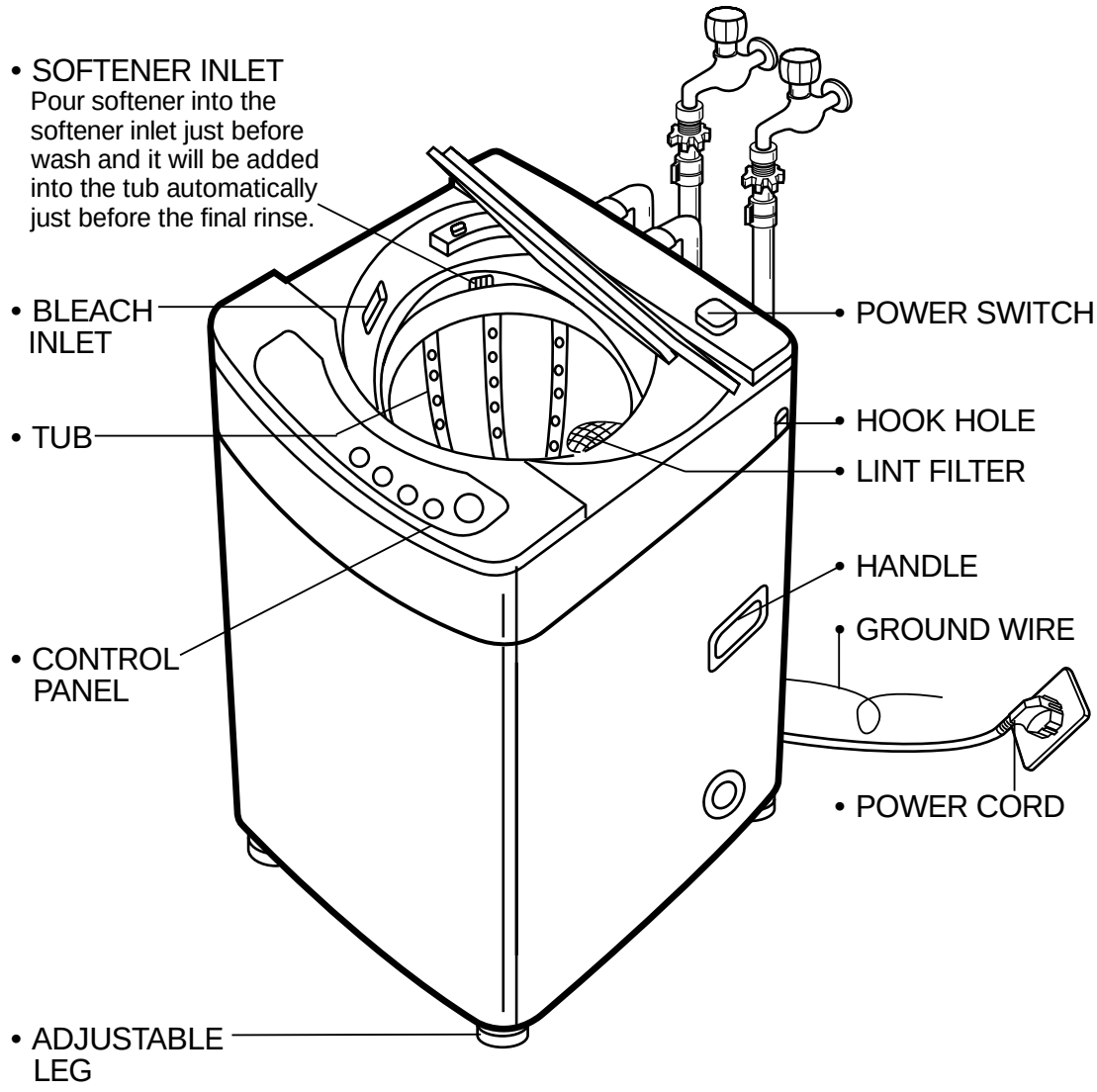
ACROSS SECTION



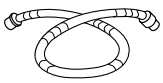
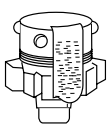
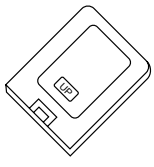
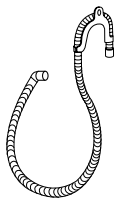
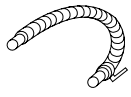
FUNCTIONAL PRINCIPLE

Bubble generator supplies the air from the bottom of outer tub to the inner space of pulsator, the air is dispersed by the rotation of pulsator. Air-bubble is created by the centrifugal force, and rises up.

3. STRUCTURE OF THE WASHING MACHINE


• SOFTENER INLET
Pour softener into the softener inlet just before wash and it will be added into the tub automatically just before the final rinse.
• BLEACH INLET
• TUB
• CONTROL PANEL
• ADJUSTABLE LEG
• POWER SWITCH
• HOOK HOLE
• LINT FILTER
• HANDLE
• GROUND WIRE
• POWER CORD

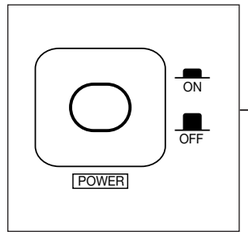
ACCESSORIES

Inlet Hose (COLD) Inlet Hose (HOT) [Option]	Water Tap Adapter (COLD) Water Tap Adapter (HOT) [Option]	Drain Hose Clamp	Under Base Cover [Option]	Drain Hose	
	 In case of screw-shaped inlet hoses water tap adapters will not be provided.			Pump Model 	Non-Pump Model 

4. FUNCTIONS OF THE CONTROL PANEL

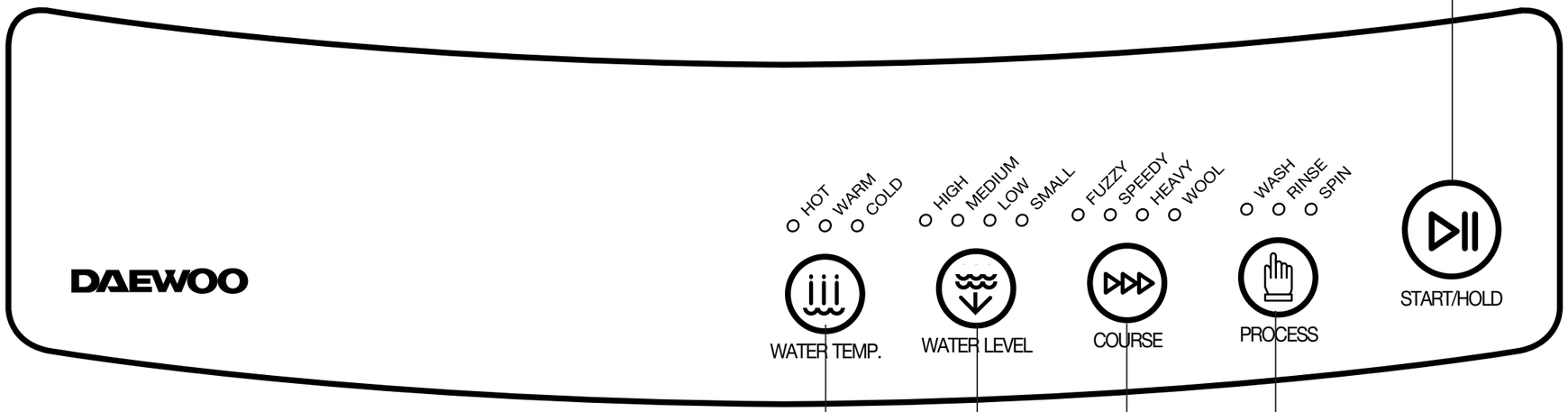
Control Panel

It has micom sensor.
As the buttons are pressed, the lamps indicating the selection of your desired washing program will light up.



Power Switch
- Press this switch to turn the power ON or OFF.
- After turning off the power, wait for more than 3 seconds and then turn it on again.

Start/Hold Button
- Press this button to begin operation or to stop operation temporarily.
- Operation and temporary stop are repeated as it is pressed.



[Option]

Temperature Selection Button
- This button is used to select the water temperature according to the clothes being washed.
- Press this button until your desired temperature indicator light comes on, and it will repeat following signs:
  COLD ¤A WARM ¤A HOT

Water Level Selector
- This selector is used to select the washing water level according to the size of the wash load.

Course Selection Button
- This button is used to select the washing course according to the type of the clothes being washed.
- You can choose one of the four courses by pressing this button until your desired course indicator light comes on.

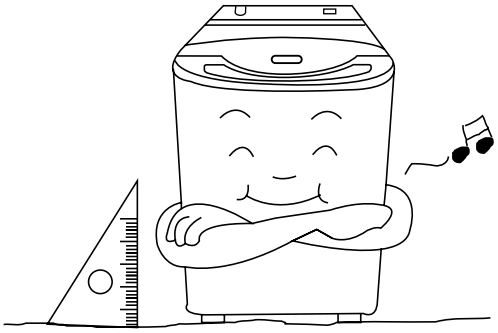
Process Selection Button
- This button is used to select the desired process of washing.
- If a full cycle of wash, rinse, and spin is not desired, the desired process can be selected by pressing this button until your desired process indicator light comes on.

5. DIRECTIONS FOR INSTALLATION AND USE

HOW TO INSTALL THE WASHING MACHINE

Selection of the Installing Place

Install the washer on the horizontal solid floor.
If the washer is installed on an unsuitable floor, it could make considerable noise and vibration.



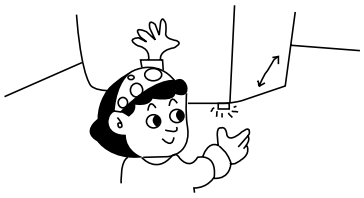
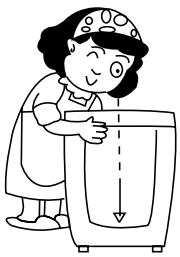
Never install in these places.

- The place where it would be exposed to direct sunlight.
- The place nearby a heater or heat appliances.
- The place where it would be supposed to be frozen in winter.
- The kitchen with coal gas and a damp place like a bathroom.

- The proper installation of the washing machine can increase the wash effectiveness and the life of it.

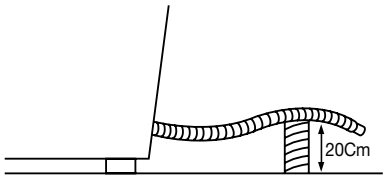
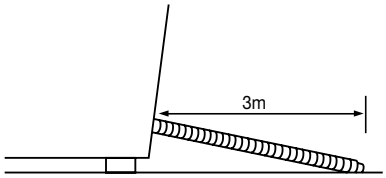
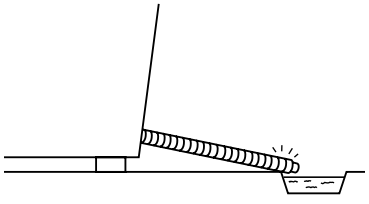
If the washer is installed on an inclined floor, it could make considerable noise and vibration and could cause a malfunction.
Use the height adjust rubber to adjust the washing machine so that it sits properly.

How to install on an Inclined Place

1. Height Setting	2. Check the Horizontal Status
• After controlling the height by turning the adjustable leg, let the washer put down to the ground.	• Check the position of tub above the center of the washer.
	

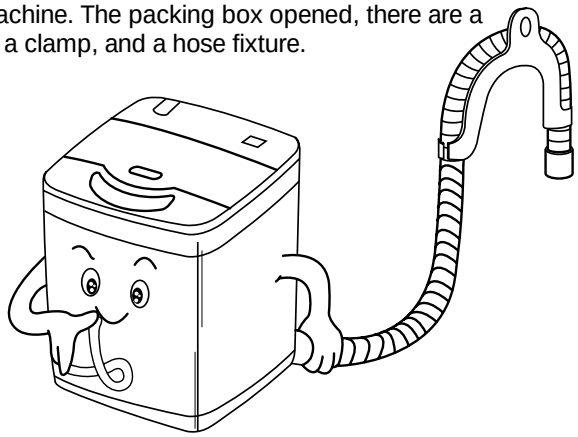
NOTES:
The opening must not be obstructed by carpeting when the washing machine is installed on a carpeted floor.

Installing the Drain Hose [Non-pump Model]

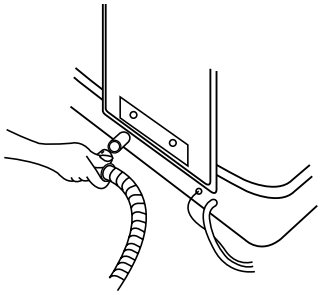
1	2	3
In case that it goes over a doorsill. Don't let the height of the drain hose exceed 20cm from the gound.	In case of extending the drain hose. Don't let the total length exceed 3m.	Be careful that the end of the drain hose is not immersed in water.
		

Installing the Drain Hose [Pump Model]

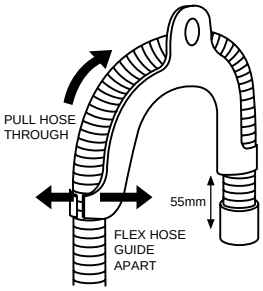
Never forget to install drain hose before operating this washing machine. The packing box opened, there are a drain hose, a clamp, and a hose fixture.



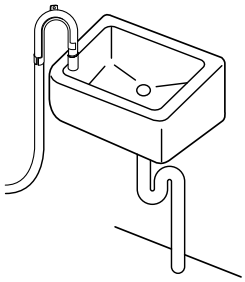
1 Connect the drain hose to the drain outlet at the rear side of the washing machine, and fasten it tightly with the clamp supplied.



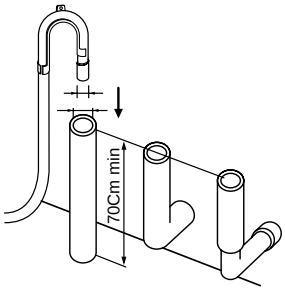
2 Attach the hose guide, included in the accessory kit, to guide the drain hose over the tub or standpipe.



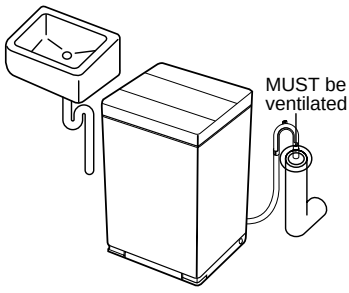
3 Hook the drain hose to the edge of the tub, paying attention that there are no bends or constractions along the drain hose.



Or, connect the drain hose to a standpipe of a diameter greater than that of the drain hose and at a height of min. 70cm.



4 Position the washing machine next to the wall.



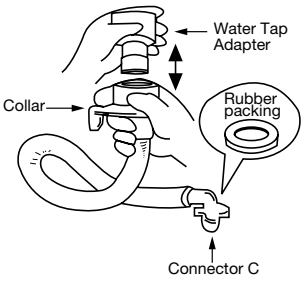
NOTES:

1. Let the highest point of the drain hose be more than 1m above the floor.
   If not so, the water in the washer could be drained during operation
2. Be sure that the height of the drain hose must be less than 1.5m above the floor.
   If not so, the water in the washer could not drain.
3. The hose guide MUST be fitted to the drain hose. The drain hose sould not extend more than 55mm from the end of the hose guide. This is to prevent 'SYPHONING'.
   If necessary the drain hose can be trimmed to length.

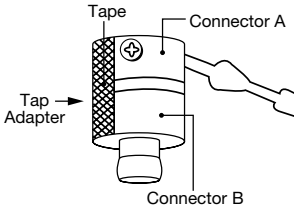
HOW TO CONNECT THE INLET HOSE

In Installing the Inlet Hose

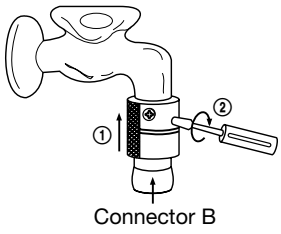
1 Pull down the collar of the inlet hose to separate it from the water tap adapter.



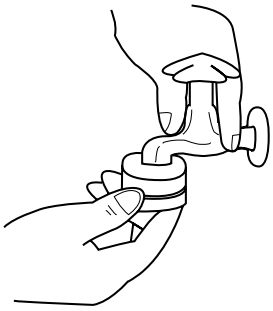
2 Loosen the four screw at the water tap adapter, but don't loosen the screws until they are separated from the water tap adapter.



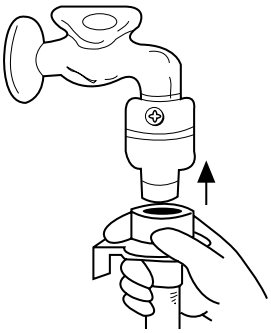
3 Connect the water tap adapter to the water tap, and tighten the four screws evenly while pushing up the adapter so that the rubber packing can stick to the water tap tightly.



4 Remove the tape, and screw connector B into connector A tightly.



5 Connect the inlet hose to the water tap adapter by pulling down the collar of the hose end.

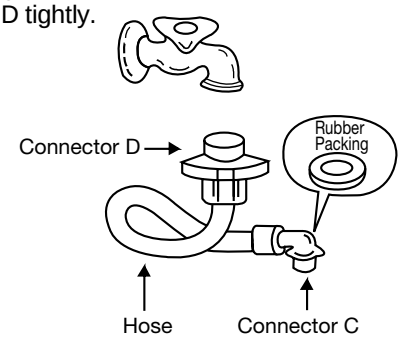


6 Connect the connector C of the inlet hose to the water inlet of the washer by turning it clock-wise to be fixed tightly.

- Please check the rubber packing inside the connector C of the inlet hose.

For Screw-Shaped Tap

7 Connect the inlet hose to the water tap by screwing the connector D tightly.

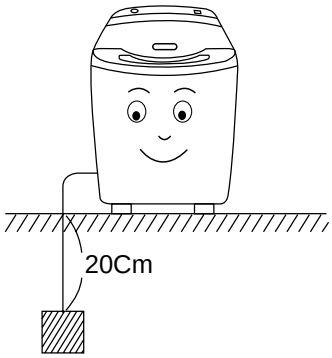
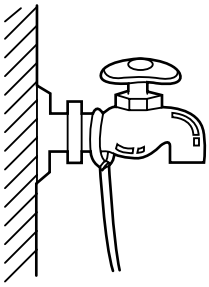
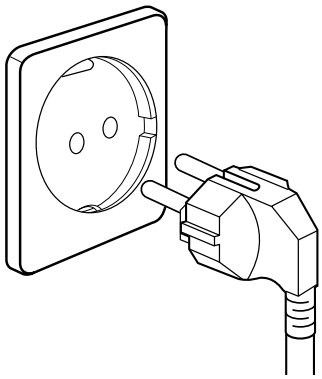


2 Connect the connector C of the inlet hose to the water inlet of the washer by turning it clockwise to be fixed tightly.

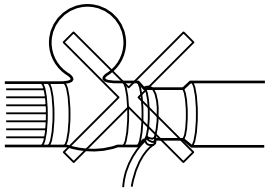
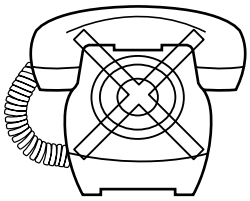
- Please check the rubber packing inside the connector C of the inlet hose.

HOW TO GROUND THE WIRE

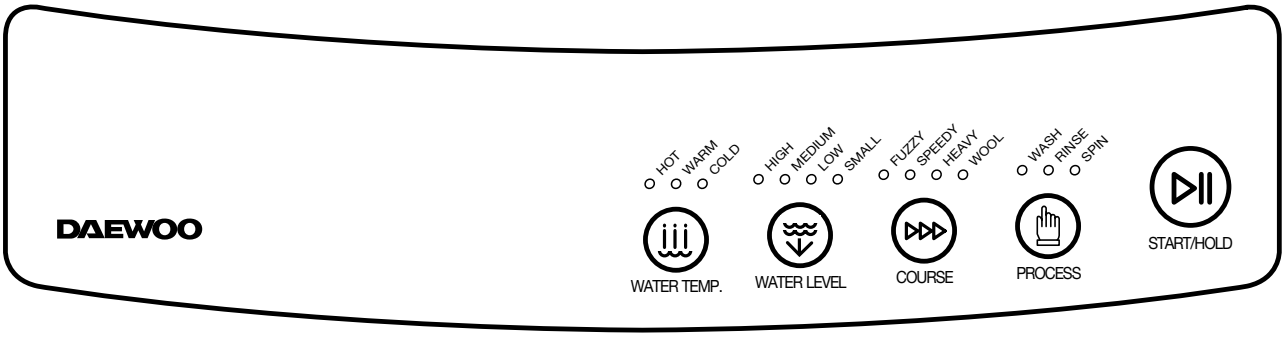
Grounding Method

• If your water tap or water pipe is not made of metal, connect the ground wire to a copper plate or a metal rod and bury it in the earth.  	• If both your water tap and water pipe are made of metal, connect the ground wire to the base of the water tap.  * It is of no use connecting the ground wire to the water pipe made of plastic.	• In case of using 3-core cord, there is no need for grounding. 

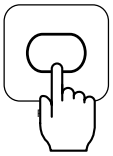
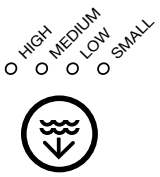
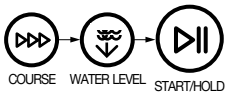
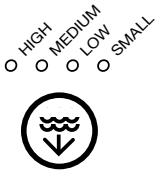
Never Connect the Ground Wire to Such a Thing

• Never connect it to a gas pipe because of danger of a explosion.  Gas Pipe	• Never connect it to a telephone wire or a lightning rod because it is very dangerous at a thunderbolt.  Telephone Wire

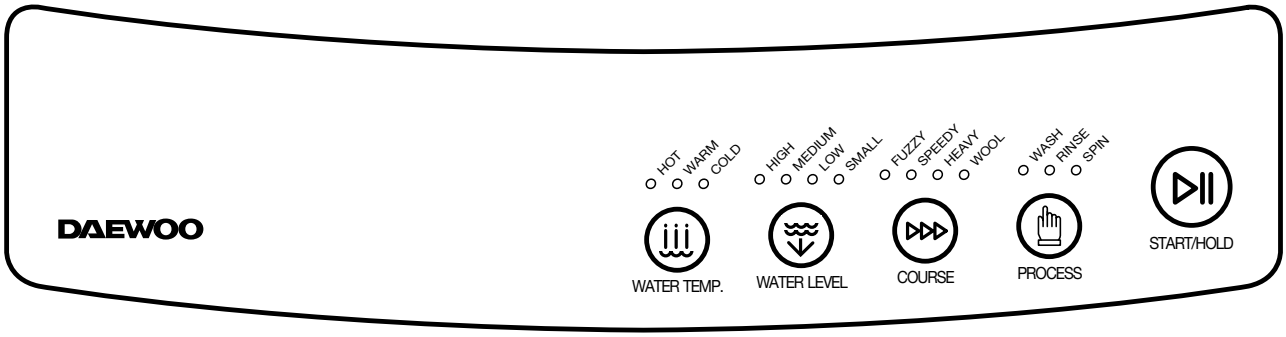
6. PROCEDURE OF FULL-AUTOMATIC WASHING



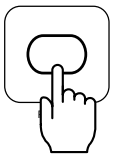
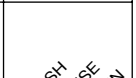
Full Automatic Course

Pressing the Power Switch	Selecting Course		Selecting Water level	Procedure to Press the Button	
	Course	Kinds of the Clothes			
	Fuzzy Course	General clothes	• The Water level is selected automatically	START/HOLD	End of Washing It is informed by buzzer.
	Speed Course	Lightly stained clothes: under-wear, T-shirts, Y-shirts, etc..			
	Heavy Course	Heavily stained clothes: blue-jean, climbing clothes, ruck-sack, sports wear, etc..	• The Water level is fixed to "HIGH"		
	Wool Course	Delicate clothes: Sweater, silk, lingerie, etc.			

After Operation is finished
- Close the water tap, and disconnect the inlet hose if necessary.
- Turn off the power, and disconnect the power cord from the electric outlet, being sure to take hold of the plug.
- Clean the lint filter.



Partial Selections Among Wash, Rinse or Spin

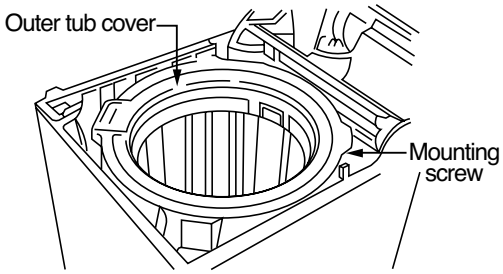
Pressing the Power Switch	Selecting Water level	Selecting Process					
			Stage 1	Only Wash			End of Process It is informed by buzzer.
			Stage 2	Only Rinse			
			Stage 3	Only Spin			
			Stage 4	Wash and Rinse			
			Stage 5	Rinse and Spin			

7. DIRECTIONS FOR DISASSEMBLY AND ADJUSTMENT

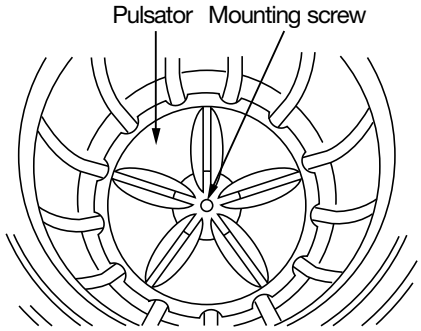
WARNING
BEFORE ATTEMPTING TO SERVICE OR ADJUST ANY PART OF THE WASHING MACHINE, DISCONNECT THE POWER CORD FROM THE ELECTRIC OUTLET.

GEAR MECHANISM ASS'Y REPLACEMENT

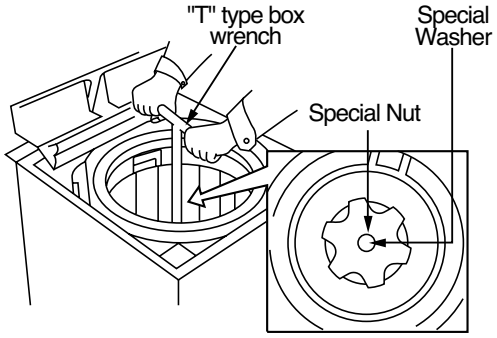
- Raise the top plate on the outer cabinet.
- Loosen four screws mounting outer tub cover and remove outer tub cover from the tub ass'y



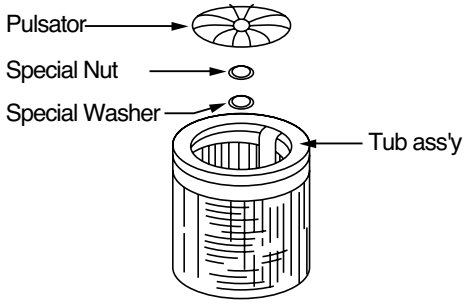
- Loosen the pulsator mounting screw and remove pulsator.



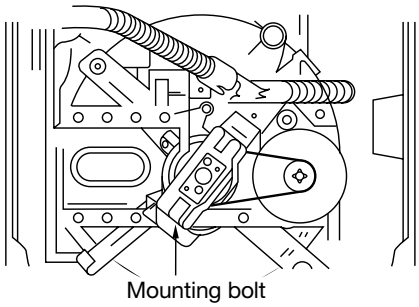
- Remove the special Nut by using 'T' type box wrench.
- Remove the special washer.



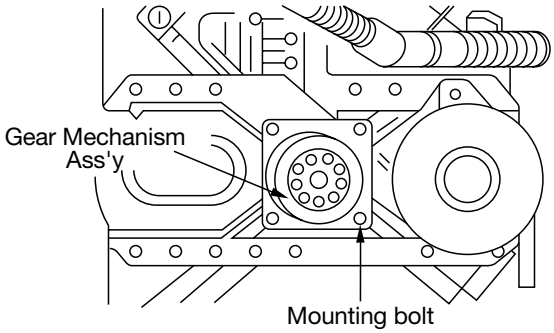
- Remove the tub ass'y.



- Lay the front of the washer on the floor.
- Remove four bolts mounting the gear protect by using a box wrench and remove gear protect.
- Remove the V-belt.



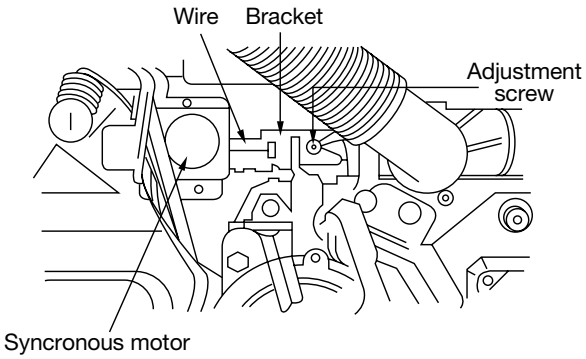
- Remove four bolts mounting the gear mechanism ass'y by using a box wrench.
- Pull out the gear machanism ass'y.



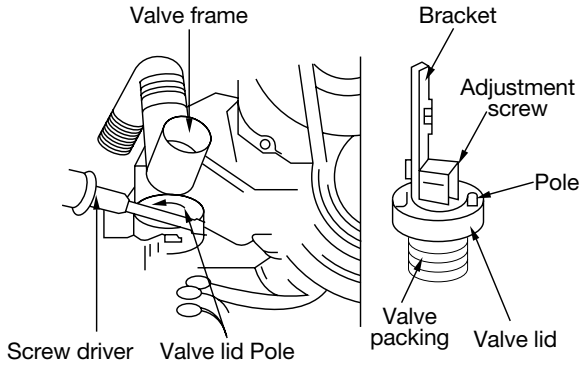
NOTE: To assemble the gear mechanism ass'y, reverse the disassembly procedure.

SYNCRONOUS MOTOR AND VALVE REPLACEMENT

- Lay the front of the washer on the floor.
- Loosen the adjustment screw and three bolts mounting the drain motor.
- Take out the wire of syncronous motor from the bracket.

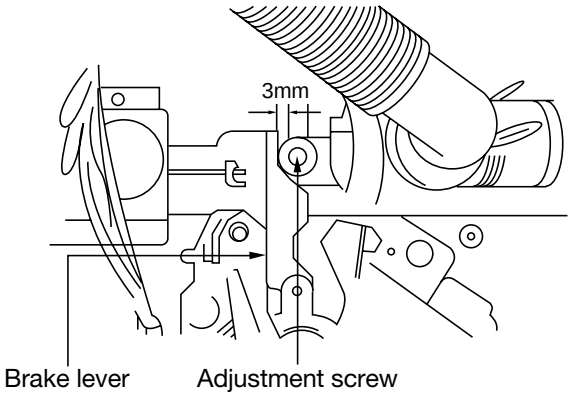


- Separate the syncronous motor from the bracket.
- Turn the valve lid by using screw driver as shown in figure and remove the valve lid from the valve frame.

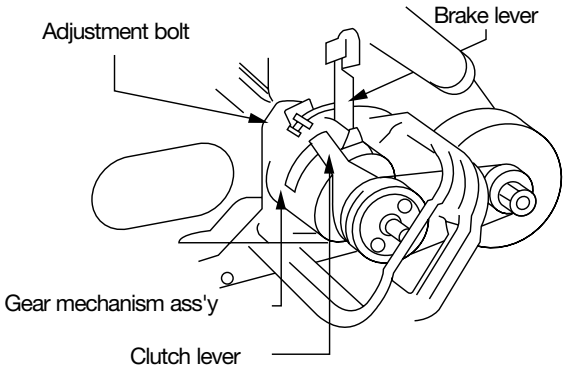


BRAKE ADJUSTMENT

- Loosen the adjustment screw fastening the bracket and place the adjustment screw to the brake lever as shown in figure.
- Tighten the adjustment screw completely.



- Loosen the adjustment bolt and turn the adjustment bolt until the end of the bolt touches to the b rake lever.
- Tighten the lock nut and apply a small amount of paint-lock.



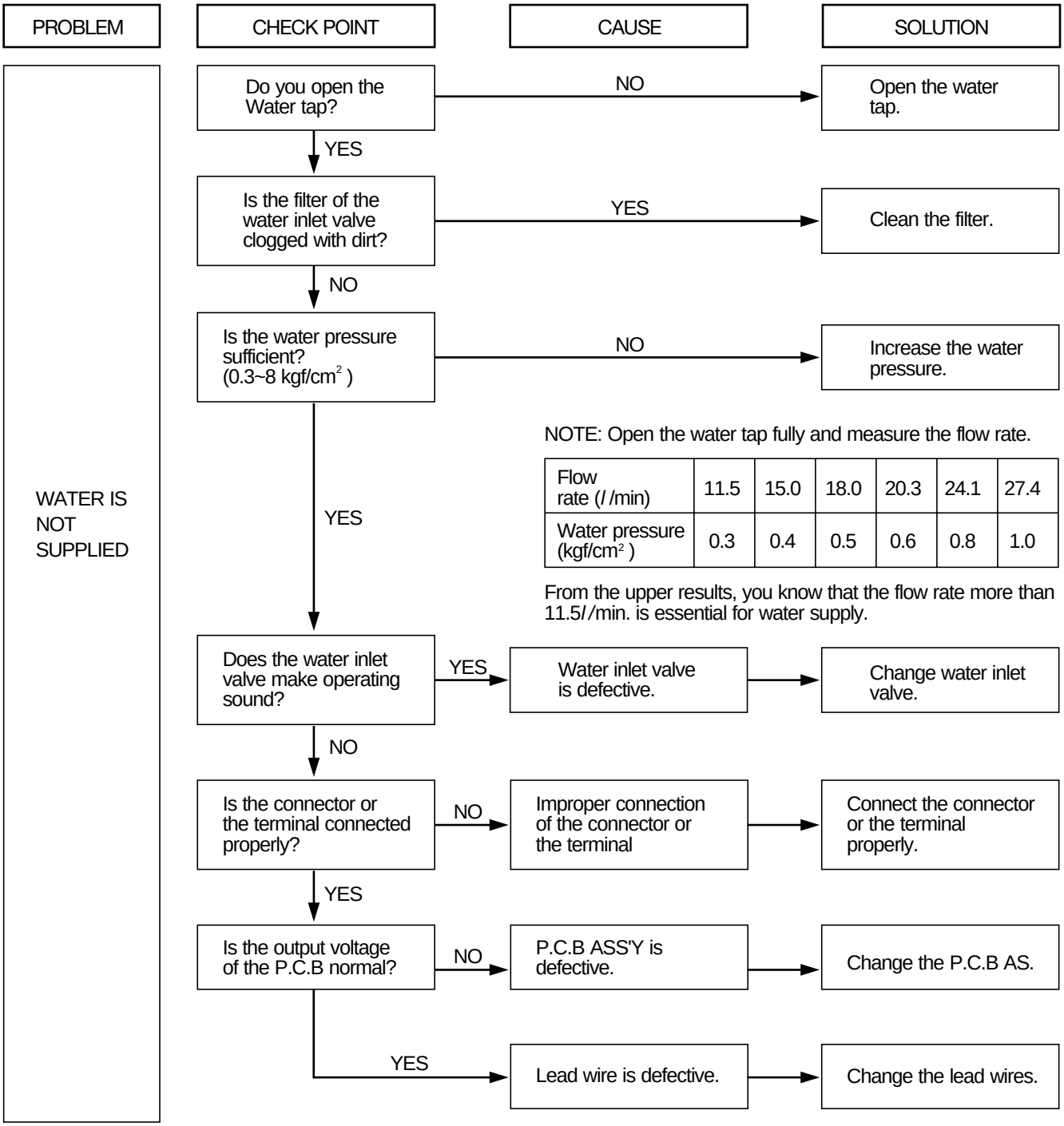
NOTE:

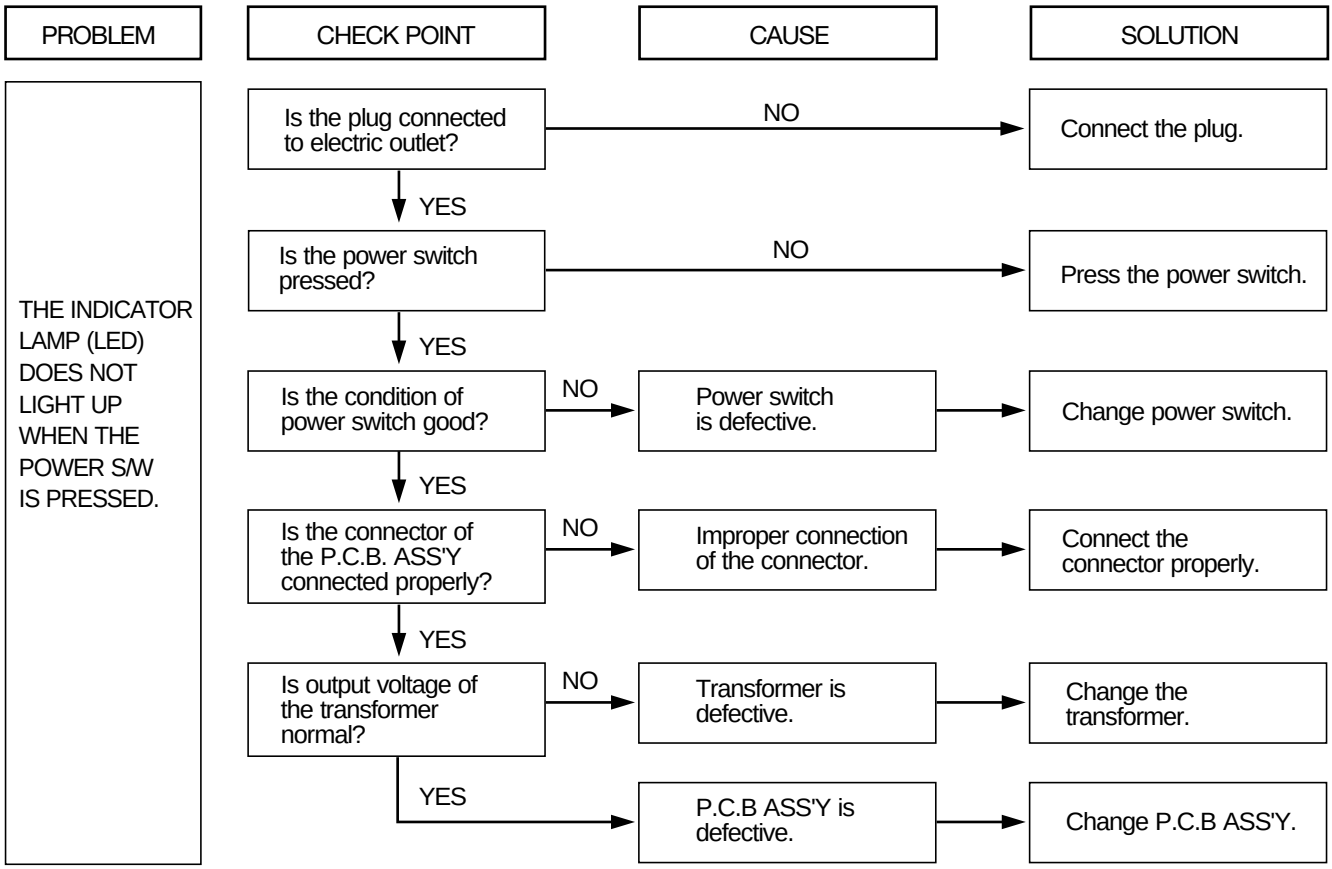
1. The brake adjustment has been made at the factory, so that it is not to re-adjust. However, in case of insufficient brake operation, perform the upper procedure.
2. Overtightening of the adjustment bolt will cause poor brake performance.
3. Undertightening of the adjustment bolt will cause continuous bracking and, thereby, cause the problems of the motor during the spin cycle.

8. TROUBLE SHOOTING GUIDE

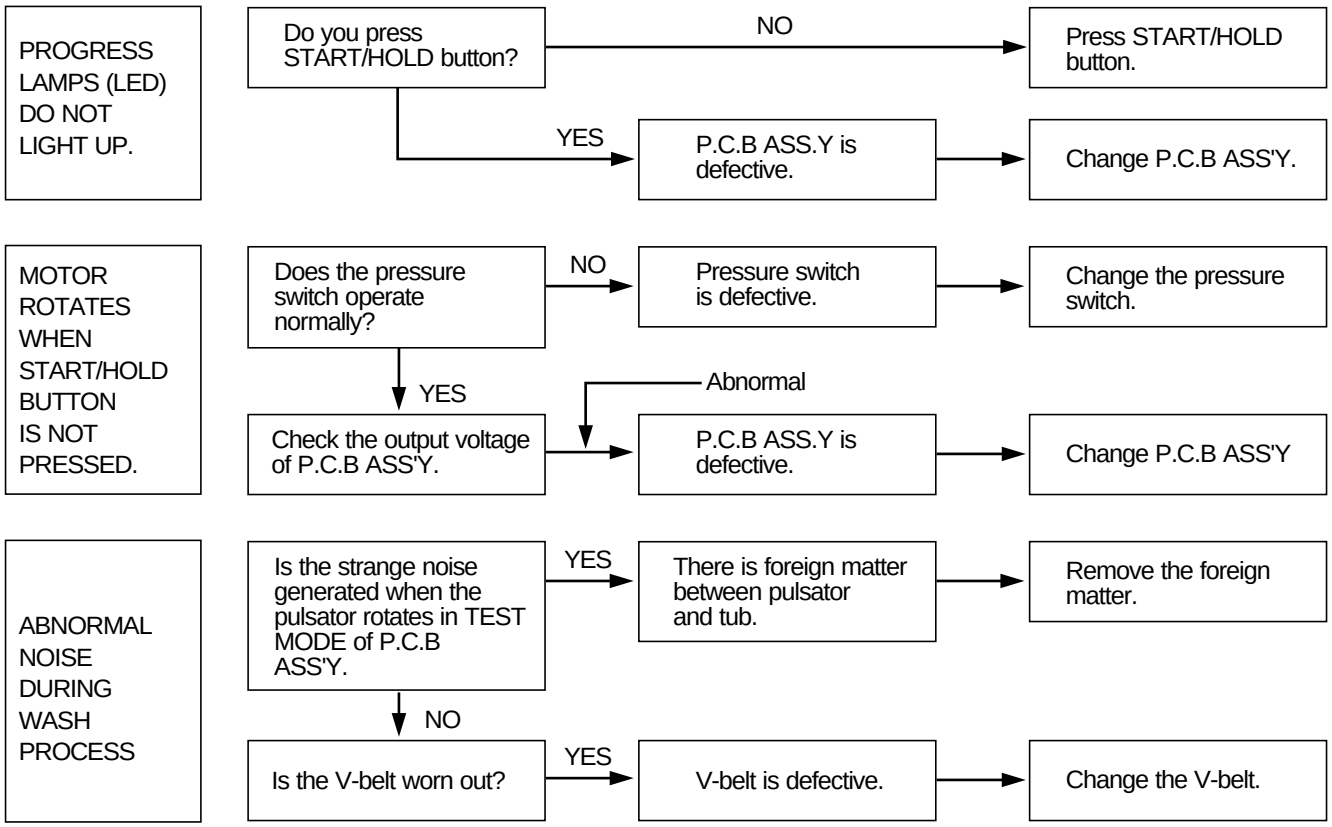
NOTE:
1. When you replace the P.C.B. ASS'Y do not scratch the surface of the P.C.B. ASS'Y.
2. Disconnect the power cord from the electric outlet.

CONCERNING WATER SUPPLY

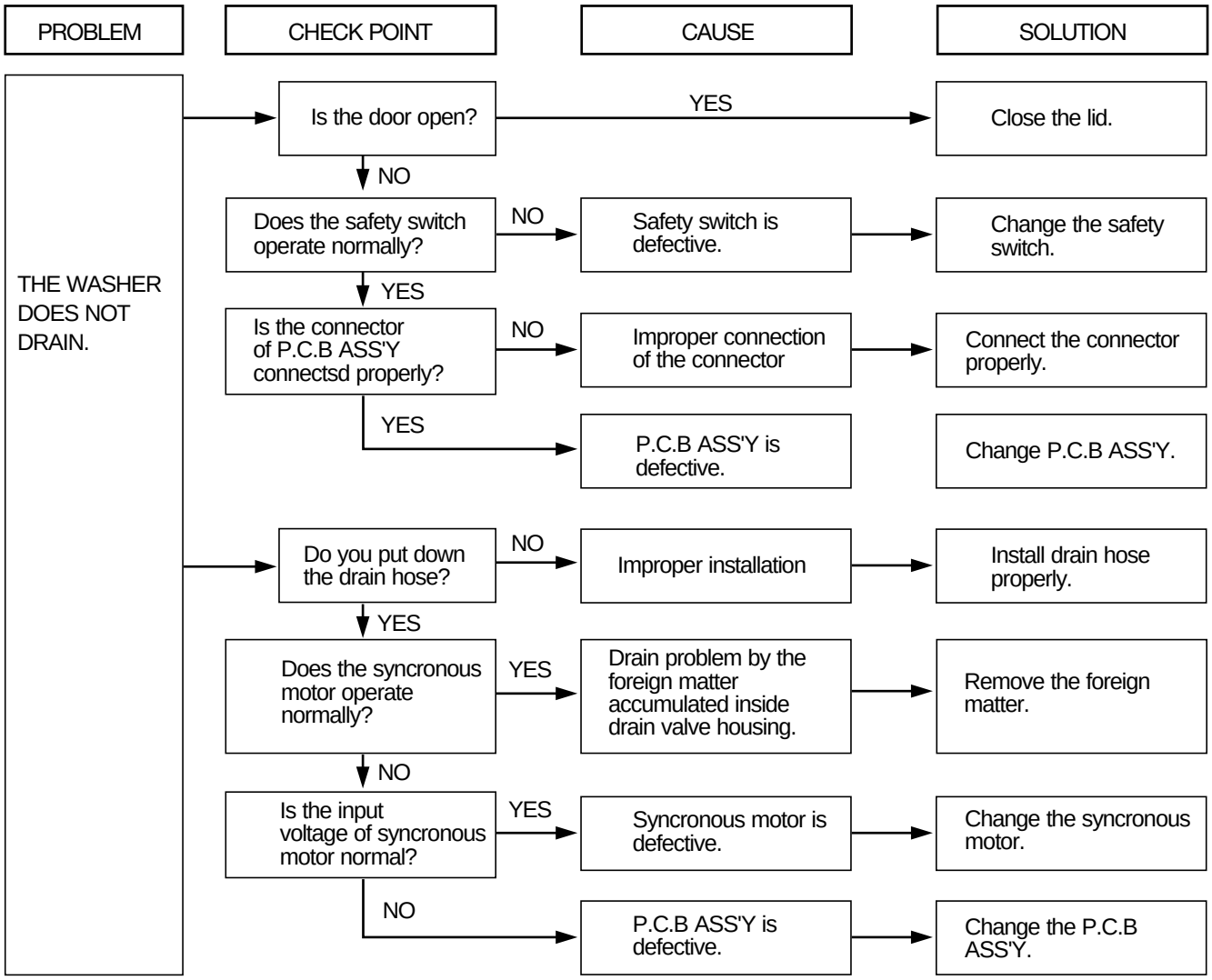

PROBLEM
CHECK POINT
CAUSE
SOLUTION
WATER IS NOT SUPPLIED
Do you open the Water tap?
NO
Open the water tap.
YES
Is the filter of the water inlet valve clogged with dirt?
YES
Clean the filter.
NO
Is the water pressure sufficient? (0.3~8 kgf/cm2)
NO
Increase the water pressure.
YES
NOTE: Open the water tap fully and measure the flow rate.
Flow rate (l /min) 11.5 15.0 18.0 20.3 24.1 27.4
Water pressure (kgf/cm2) 0.3 0.4 0.5 0.6 0.8 1.0
From the upper results, you know that the flow rate more than 11.5l /min. is essential for water supply.
Does the water inlet valve make operating sound?
YES
Water inlet valve is defective.
Change water inlet valve.
NO
Is the connector or the terminal connected properly?
NO
Improper connection of the connector or the terminal
Connect the connector or the terminal properly.
YES
Is the output voltage of the P.C.B normal?
NO
P.C.B ASS'Y is defective.
Change the P.C.B AS.
YES
Lead wire is defective.
Change the lead wires.



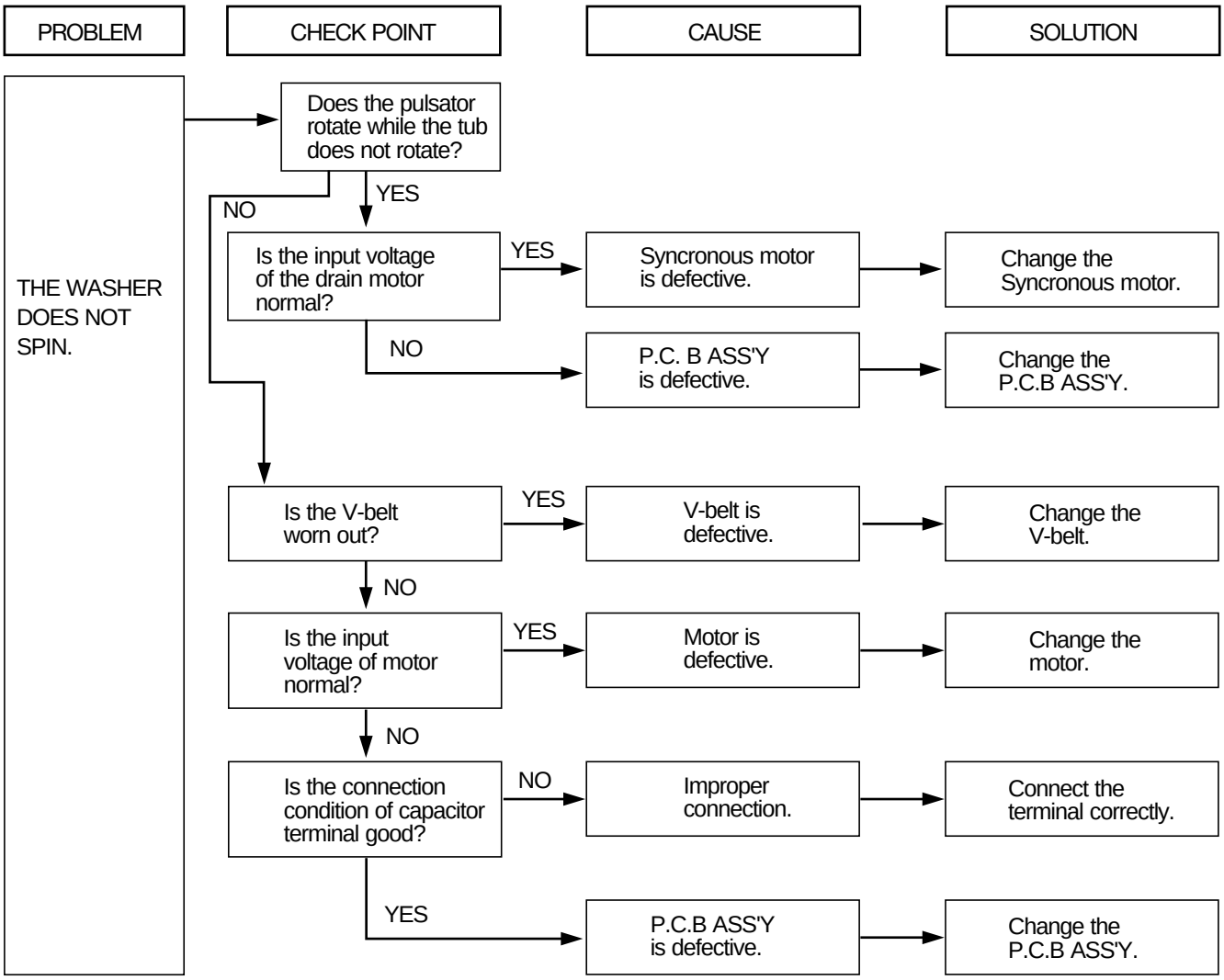
CONCERNING WASHING


PROGRESS LAMPS (LED) DO NOT LIGHT UP.
Do you press START/HOLD button?
NO
Press START/HOLD button.
YES
P.C.B ASS.Y is defective.
Change P.C.B ASS'Y.
MOTOR ROTATES WHEN START/HOLD BUTTON IS NOT PRESSED.
Does the pressure switch operate normally?
NO
Pressure switch is defective.
Change the pressure switch.
YES
Abnormal
Check the output voltage of P.C.B ASS'Y.
P.C.B ASS.Y is defective.
Change P.C.B ASS'Y
ABNORMAL NOISE DURING WASH PROCESS
Is the strange noise generated when the pulsator rotates in TEST MODE of P.C.B ASS'Y.
YES
There is foreign matter between pulsator and tub.
Remove the foreign matter.
NO
Is the V-belt worn out?
YES
V-belt is defective.
Change the V-belt.

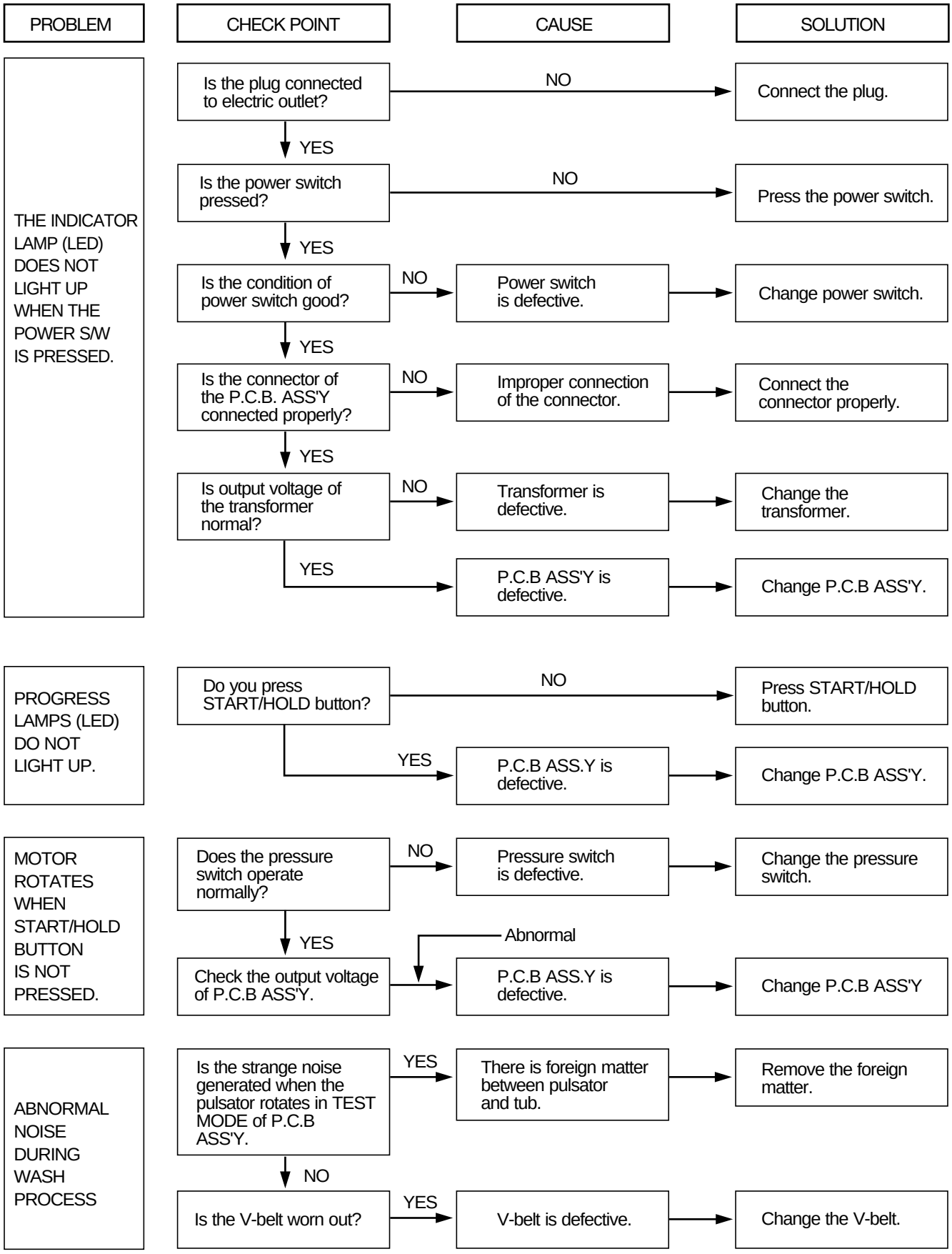
CONCERNING DRAINING



CONCERNING SPINNING



CONCERNING OPERATION



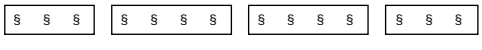
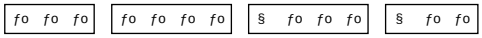
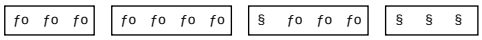
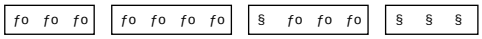
9. PRESENTATION OF THE P.C.B ASS'Y

CONCERNING ERROR MESSAGE

	MESSAGE	
	CAUSE	**SOLUTION**
DRAINAGE ERROR	*fofofo fofofofo § § § § fofofo*	
	Improper installation of drain hose.	Install drain hose properly.
	The drain hose is blocked up by foreign matter.	Remove foreign matter from drain hose.
	Drain motor is inferior.	Change drain motor.
INLET ERROR	*fofofo fofofofo § § § § § § §*	
	The water tap is closed.	Open the water tap.
	The water inlet filter clogged.	Clean the water inlet filter.
	It passes over the 30 minutes, yet it doesn't come to assigned water level.	Check whether or not it comes to the assigned water level.
UN-BLANCE ERROR	*fofofo § § § § fofofofo fofofo*	
	Wash loads get uneven during spin.	Re-set wash loads evenly.
	Poor installation of the unit.	Install properly.
DOOR OPEN ERROR	*fofofo fofofofo fofofofo § § §*	
	The door is opened.	Close the door.
	The safety switch is inferior.	Change the safety switch.
LEVEL SENSING ERROR	*fofofo § § § § fofofofo § § §*	
	The water level sensing is inferior.	Check the water level sensor and the contact parts of the connector.

TEST MODE

The operation condition of the washer can be checked without water in the tub by test mode of the P.C.B. ASS'Y as shown below.

No. of times to press button 'Water Level'	Check Mode	DISPLAY	Items being checked	The condition of normal operation
0	A		• Buzzer sound indicating the end of washing • L.E.D lamp	• The buzzer sound 8 times while the indicator lights blinks
1	B		• The condition of wash process (Motor)	• The pulsator rotates continuously without water in the tub
2	C		• The functional condition of whole operating	• The washer repeates following operating Drain ¤ASpin ¤A Cold Water ¤AHot Water ¤APulsator rotate (right) ¤A Bubble ¤APulsator rotate (left) ¤A Pump¤ADoor check ¤AINITIAL STATE
3	D		• Aging Mode for P.C.B. ASS'Y	• C Mode runs continously without INITIAL STATE

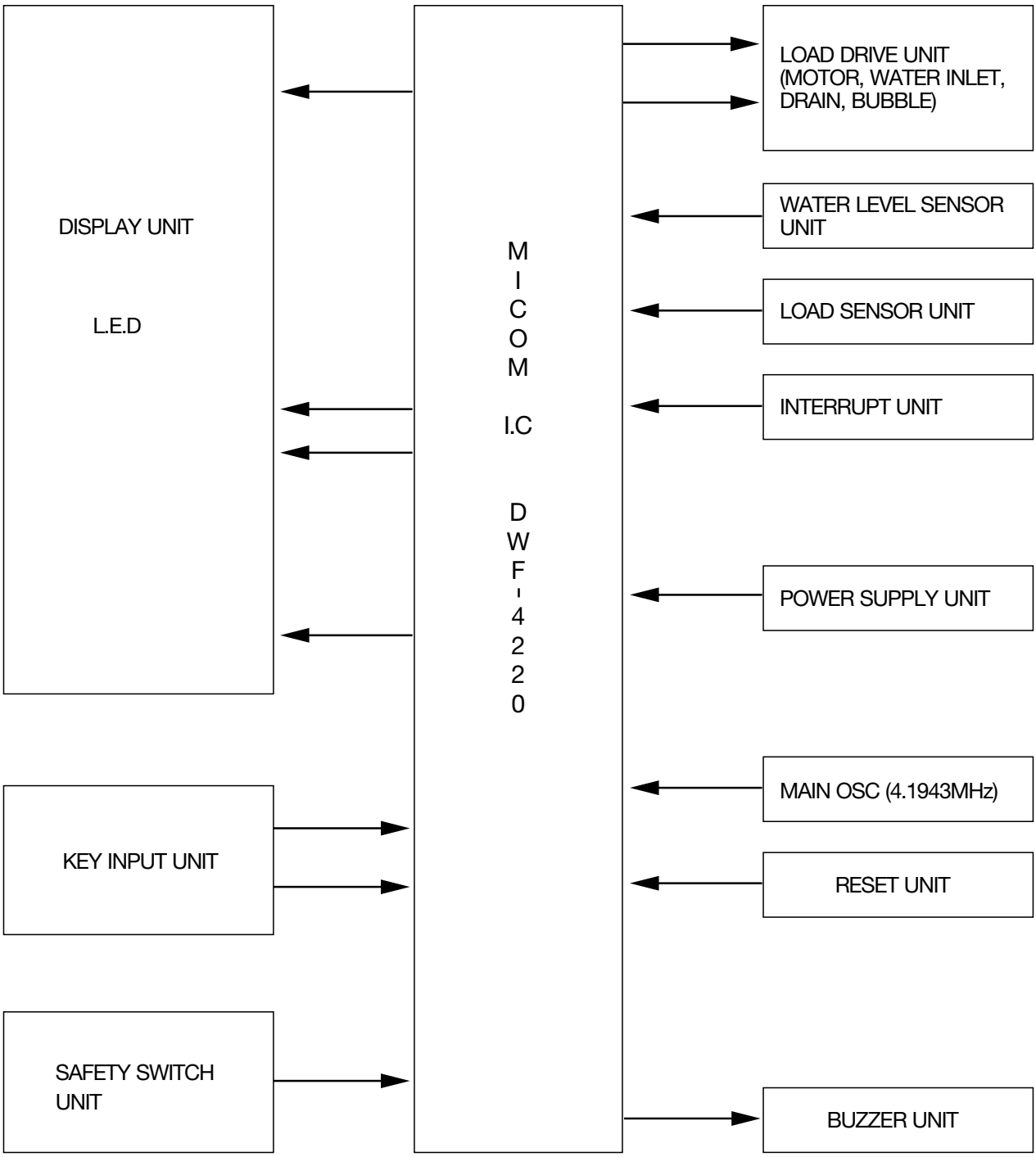
HOW TO OPERATE TEST MODE

1. Turn off the power.
2. Keep pressing two buttons ('WATER LEVEL', 'COURSE'.) together and press the power switch.
3. Remove your fingers on the two buttons.
4. Press the 'WATER LEVEL' button according to desired check mode.
5. It is possible to stop operation temporarily by pressing 'START/HOLD' button.

NOTE:

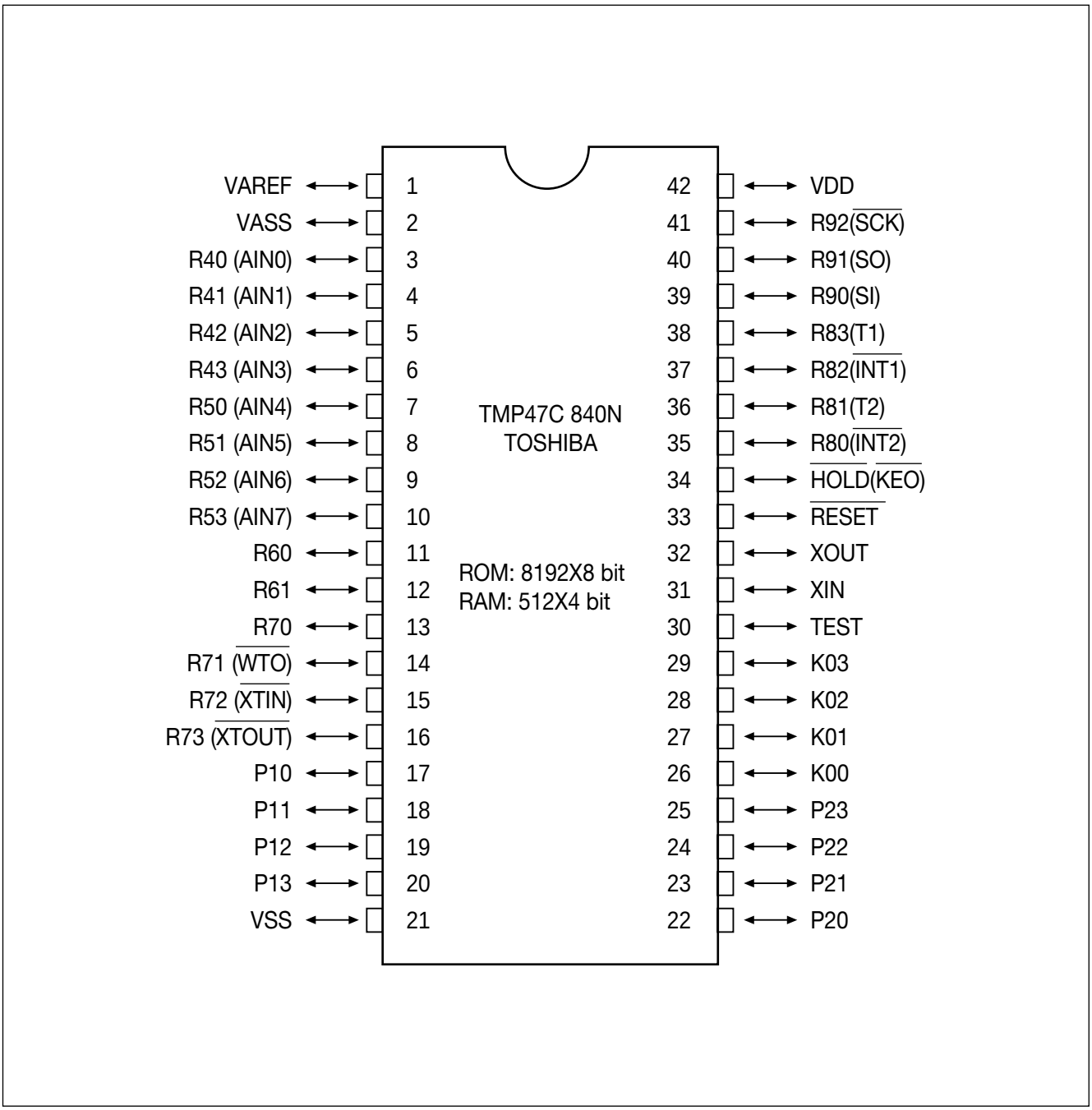
- If pressing 'PROCESS' button within 10 seconds, the check mode changes to 'B', 'C' and 'D' mode.
- If 'PROCESS' button is not pressed, 'A' mode will run.

CONFIGURATION OF FULL CIRCUITS



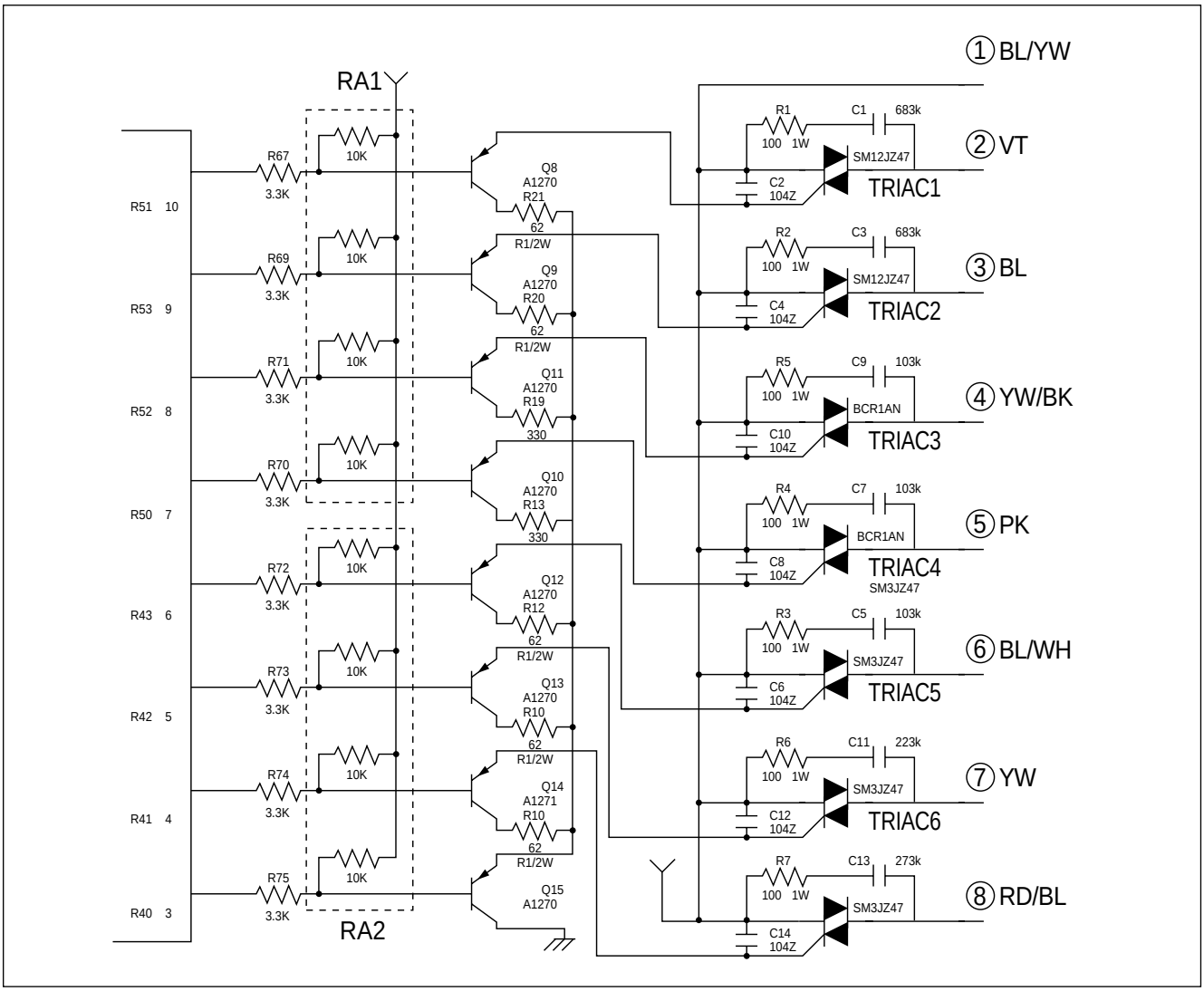
MINUTE EXPLANATION DIAGRAM FOR EACH PARTS

MICOM IC (42 DIP)



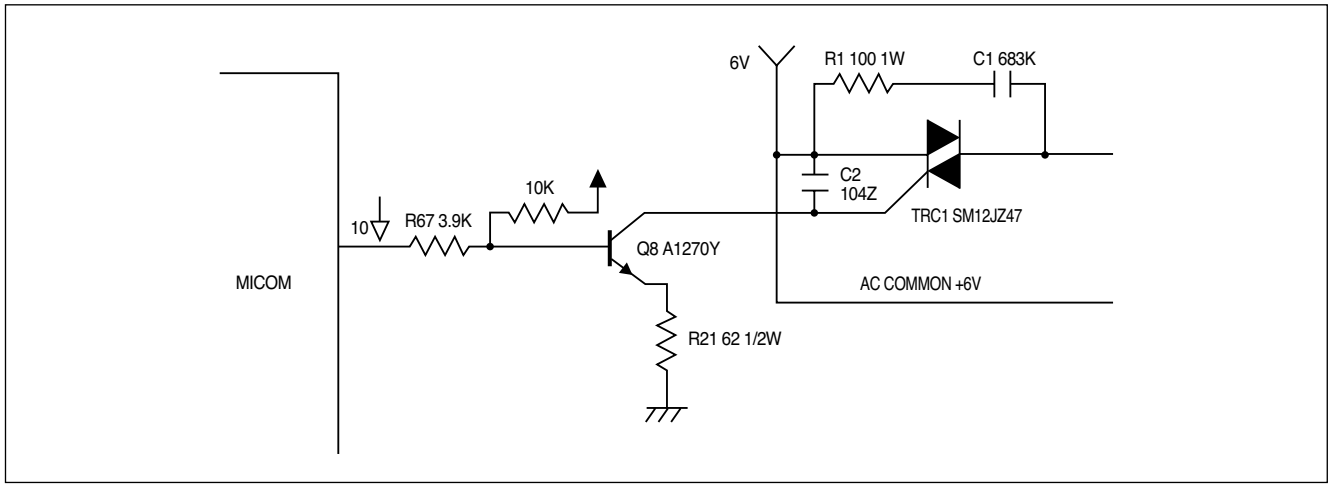
LOAD DRIVE UNIT
(CW WASH, CCW WASH, DRAINAGE, BUBBLE, PUMP, HOT WATER, COLD WATER)

1. CIRCUIT DIAGRAM AND EXPLANATION



- Controlling load of button input in MICOM terminal, it is selected to 'H' or 'L'. It is selected to 'L' in running load case and in 'H' case, load driving is finished. In clockwise rotation of washing motor, as MICOM No. 10 is changed 6V to 0V, TR (Q8, A1270Y) is turn on. And then, the TRIAC1 (SM12JZ47) is turn on, the source of electric power is supplyed to washing motor for clockwise rotation. The TRIAC, as switching element, force to 'ON' or 'OFF' by use of the Q8 (A1270Y). In the rest loads, when the MICOM terminal voltage changes 6V to 0V, each TRIAC DRIVE TR is active, and then the TRIAC switches the source of electric power to loads.
- The purpose of using the MICOM terminal No.3 Q15 (A1271Y) is that the Q15 prevents the instant supply of electric power supply to loads, in case MICOM's action is wrong by means of pushing initial power switch.

2. DETAIL EXPLANATION OF CIRCUIT ACTION (ACTION OF CW WASH)

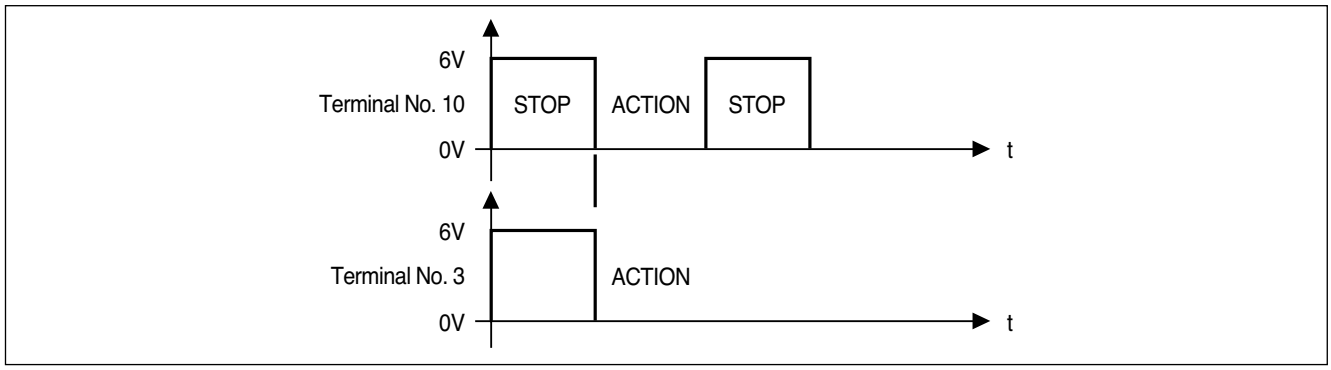


- In case MICOM TERMINAL No. 10 is 'L', the Q8 (A1270Y) turn on and control the TRIAC. The resistance, as 62Ω & 1/2W, of the R21 is used to limit the GATE current of the TRIAC.

- The ceramic condenser C2 between the T1 and the GATE of the TRIAC is used for preventing the wrong action by means of the noise.

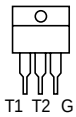
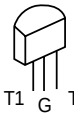
- The R1 (100Ω, 1W) and C1 (683K) between the T1 and T2 of the TRIAC is used for protecting the TRIAC, it is usually called SNUBBER CIRCUIT.

- The waveform of MICOM pin No. 1



3. CAUTION AND CHECKING FOR A/S

- If load is active as soon as the power switch is 'ON', check the driving TRIAC of load.

SM12JZ47 (12A), SM8JZ47 (8A) SM3J247 (3A)		BCR1AM-12L	
shape 	• CHECK the resistance of the T1 & T2 of the TRIAC. (∞Ω). • CHECK the total parts without fail, in case the TRIAC has a short circuit.	shape 	• CHECK the resistance of the T1 & T2 of the TRIAC. (∞Ω). • CHECK the total parts without fail, in case the TRIAC has a short circuit.

- Check the MICOM output terminal, if the load doesn't act although the TRIAC isn't anything wrong.

- Sometimes it is happened that the TRIAC DRIVE TR has a short circuit or an open circuit. In this case, being measured the resistance between the TR E & C with tester, the resistance value should be near the ∞Ω. If not, the DRIVE TR is out of order.

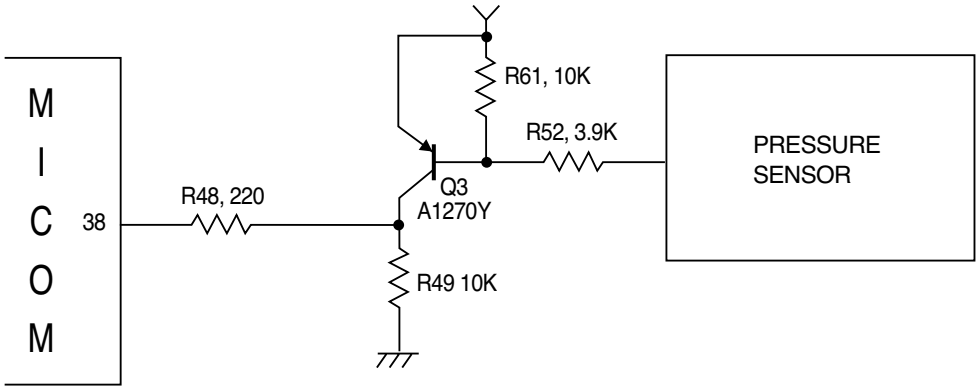
- If the ceramic condenser (C2, C4, C6, C8, C10, C12, C14) using by protecting the noise between the GATE & T1 of each TRIAC has a short circuit, it has no voltage drop between the T1 and GATE. Therefore, the TRIAC is not turn on.

• The TRIAC's names and the values of the snubber & resistance of the total parts.

LOAD	TRIAC'S NAME	GATE'S RESISTANCES OF LIMITED CURRENTS	VALUES OF THE SNUBBER	RESISTANCES OF TOTAL PARTS
CW WASH	SM12JZ47 BCR 12PM-14L	62Ω, 1/2W	100Ω, 1W+683K AC 250V	
CCW WASH	SM12JZ47 BCR12PM-14L	62Ω, 1/2W	100Ω, 1W+683K AC 250V	
DRAINAGE	BCR1AM-12L	330Ω, 1/4W	100Ω, 1W+103K AC 250V	
HOT/COLD WATER	SM3JZ47	62Ω, 1/2W	100Ω, 1/W+223K AC 250V	
BUBBLE GENERATOR	BCR1AM-12L	330Ω, 1/4W	100Ω, 1W+103K AC 250V	
PUMP	SM8JZ47	62Ω, 1/4W	100Ω, 1W+103K AC 250V	

WATER LEVEL SENSOR UNIT1. CIRCUIT DIAGRAM

1. CIRCUIT DIAGRAM



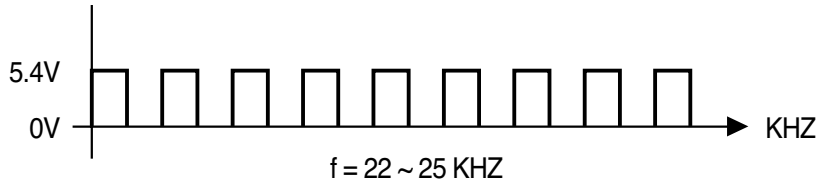
2. EXPLANATION OF CIRCUIT

- Push the power switch. And, in order to carry on the action of course selection, input the selection of frequency according to each water level selection.
- The frequency of water level sensor in each water level becomes square wave and is sended to the MICOM.

WATER LEVEL NAME	FREQUENCY	WATER LEVEL
HIGH MIDDLE LOW SMALL	23.0 kHz 23.5 kHz 24.0 kHz 24.4 kHz	450 ± 15 380 ± 15 300 ± 15 240 ± 15
RESET	25.30 kHz	
OVER FLOW	22.75 kHz	

If the water level is selected ‘HIGH’ in washing, water supply proceeds until inputing the frequency 23.0 KHz of ‘HIGH’ in the MICOM terminal No. 38. Being finished the water supply, washing process is proceeded.
After the washing process, water level reaches to RESET point, and then after the (D)+ 60 seconds, the spin process begins.

- The value of the frequency between the MICOM terminal No. 38and the GND.

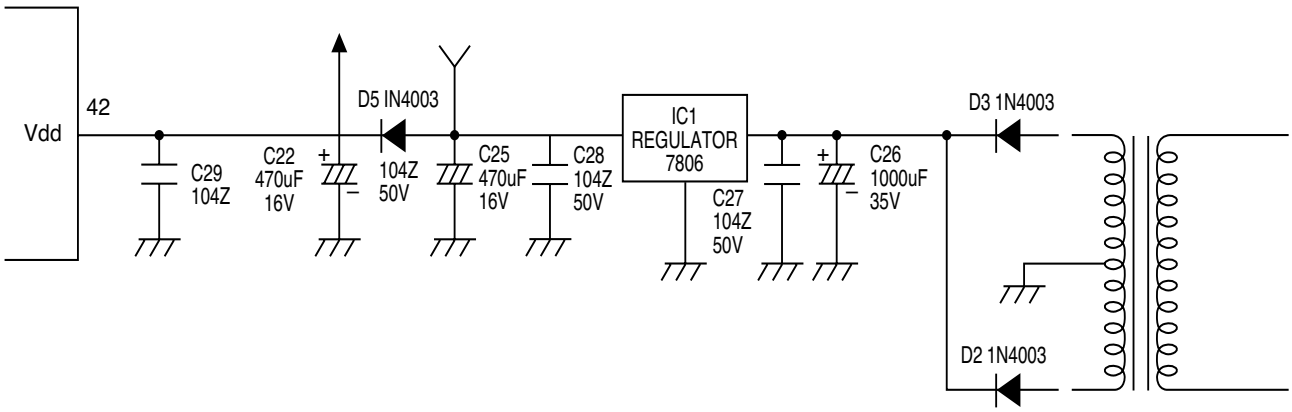


3. CAUTION FOR A/S

- The output of the frequency in the WATER LEVEL SENSOR varies in accordance with temperature and using condition. If it doesn't input the output of the WATER LEVEL SENSOR in the MICOM, the error message is displayed as 'LEVEL SENSING ERROR' (See page26). In case of proceeding the water supply continuously in 'HIGH' water level, it is desirable to change the WATER LEVEL SENSOR because of the defect in the WATER LEVEL SENSOR.
- Check the TR Q4 (A1270Y)
- Being checked with tester, the value of the voltage reaches about 4V.
- As the frequency is lower, the water level is higher.

ELECTRIC POWER SUPPLY UNIT

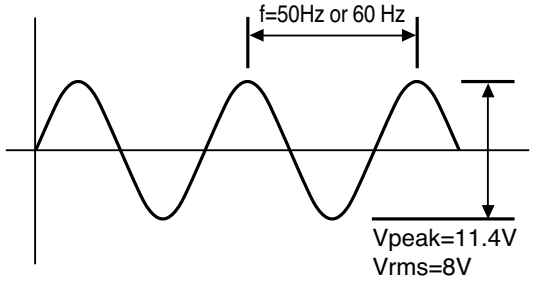
1. CIRCUIT DIAGRAM



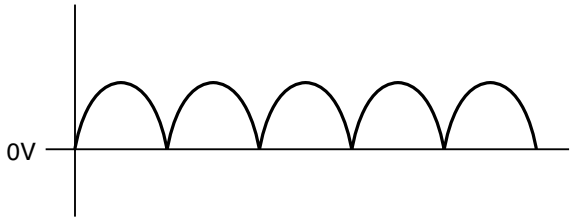
2. EXPLANATION OF CIRCUIT

- The primary voitage of the transformer sets RATING VOLTAGE, the secondary voltage of the transformer is full wave rectified by use of the D2 (1N4003) & D3 (1N4003)

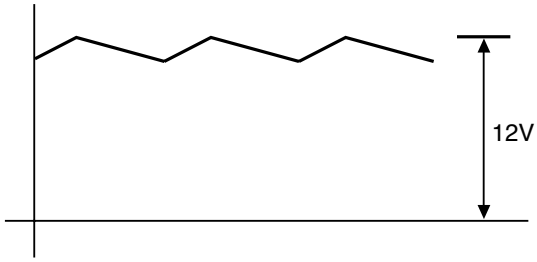
① The gray & red (The waveform in secondary part of the transformer)



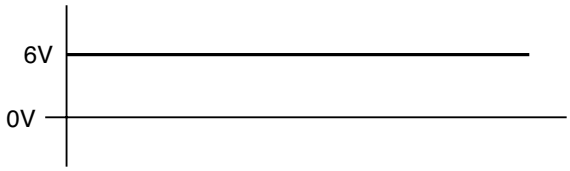
② Measuring the waveform in case of the removing condenser by the removal ripple C26.



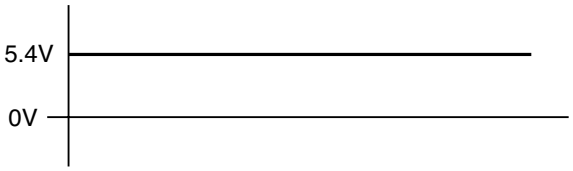
③ It is removed the ripple with attaching the C26 (1000¥F).



④ The waveform of output in the REGULATOR I.C. 7806.



⑤ The waveform after passing the D5.



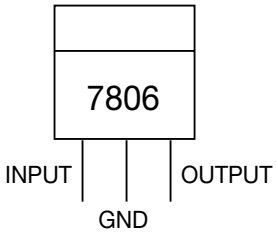
• The Electrolytic condenser C22(1000μF, 16V) and diode D5 is used in order that at instant power supply failure circuit should remember the contents of the program. It happens that the MICOM terminal No. 42 has instant interruption of electric power, yet the MICOM is not discharged electricity because of the diode D5.

• The measurement of voltage

	EFFECTIVE VALUE ①	②	③	④	⑤
82.5V	5.2V	7.9V	7.9V	5.97V	5.4V
119V	7.2V	11V	11V	5.97V	5.4V
137.5V	9.3V	14.1V	14.1V	5.98V	5.4V
165V	5.3V	7.6V	7.6V	5.96V	5.4V
220V	7.6V	10.6V	10.6	5.98V	5.4V
275V	9.7V	13.7V	13.7V	5.98V	5.4V

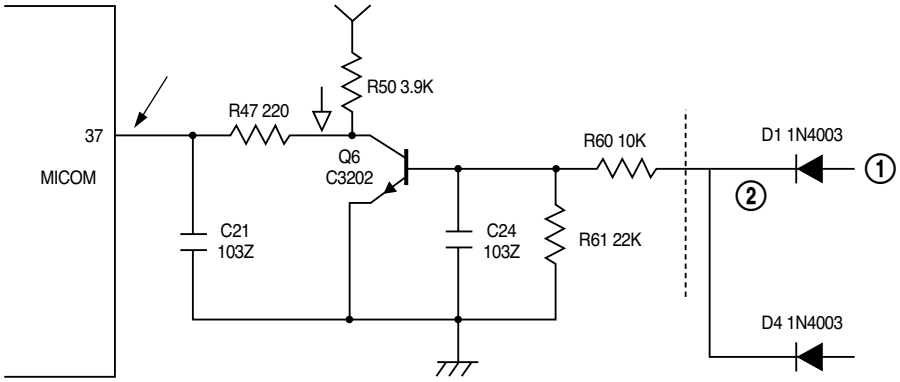
3. CAUTION FOR A/S

• Measure the voltage of input terminal REGULATOR I. C. of 7806 with tester. And, compare the measuring value with the voltage table.
• Check the condenser in case the electrolytic condenser and ceramic condenser have short circuit. The reason is that it happerns no electric power supply.



INTERRUPT UNIT

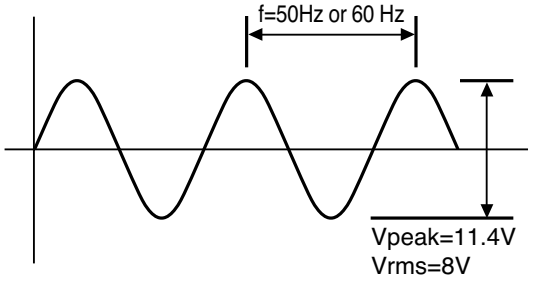
1. CIRCUIT DIAGRAM



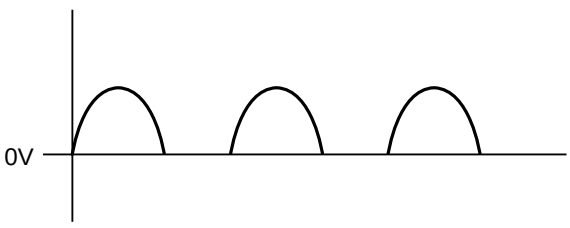
2. EXPLANATION OF CIRCUIT

The INTERRUPT UNIT is necessary to reduce the generation of surge, by use of being voitage 'ON' from the zero voltage.

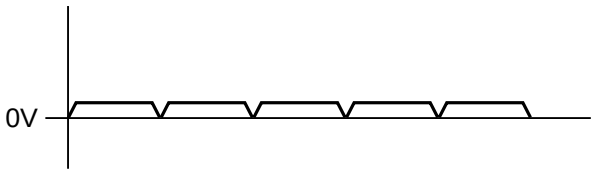
• The waveform of the part ①



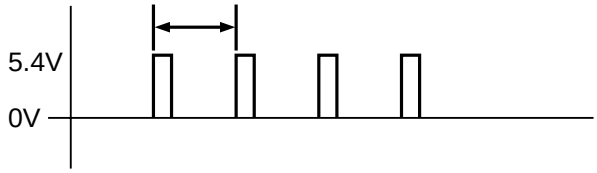
• Thewaveform of the part ② (in case of cutting the part of the dotted line)



• After connecting the part of the dotted line & waveform measurement



• The waveform measurement in the MICOM No.37.

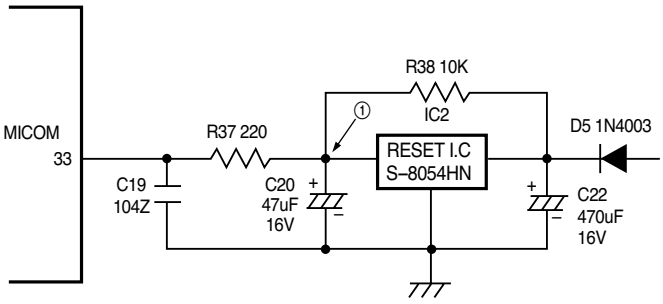


The waveform of the secondary part in transformer passes through the diode D1,D4 (1N4003), and then the voltage is divided by means of the resistance R60 & R61. This voltage gives force to input the pulse to the MICOM terminal No. 37 on the ground of action of the TR Q6 (C3202Y).

3. CAUTION FOR A/S
   • When the phenomenon of no electric power supply happens, to begin with check the electric power supply unit, and then check the INTERRUPT UNIT. It is desirable to measure Q7 (C3202Y) with tester and C21 (C103Z).

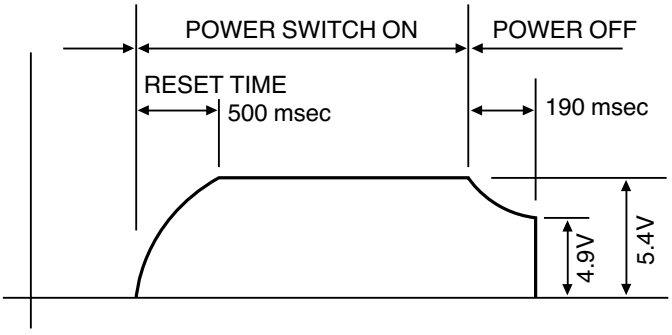
RESET UNIT

1. CIRCUIT DIAGRAM



2. EXPLANATION OF CIRCUIT
   • The RESET unit is a hardware circuit, of which all programs are initialized, when the power switch is 'ON'. Here, the reason why uses RESET I.C. is that the RESET UNIT prevents the MICOM from incorrect action. Also, the R37 & C19 (104Z), as a RC filter, is used in order to absorb the noise.

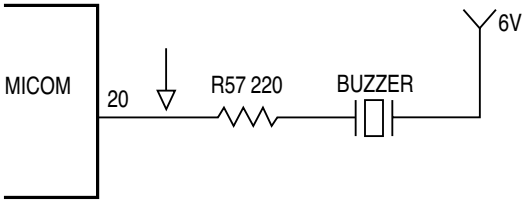
   • The waveform measurement of the part ① with being 'ON' the power switch.



3. CAUTION FOR A/S
   • Check the output of the RESET I. C. and judge whether or not it is something wrong.
      1. OUTPUT
      2. INPUT (VDD)
      3. GROUND
   • The R38 and C20 turn on the accurate RESET value with controlling the RC time constant.

BUZZER UNIT

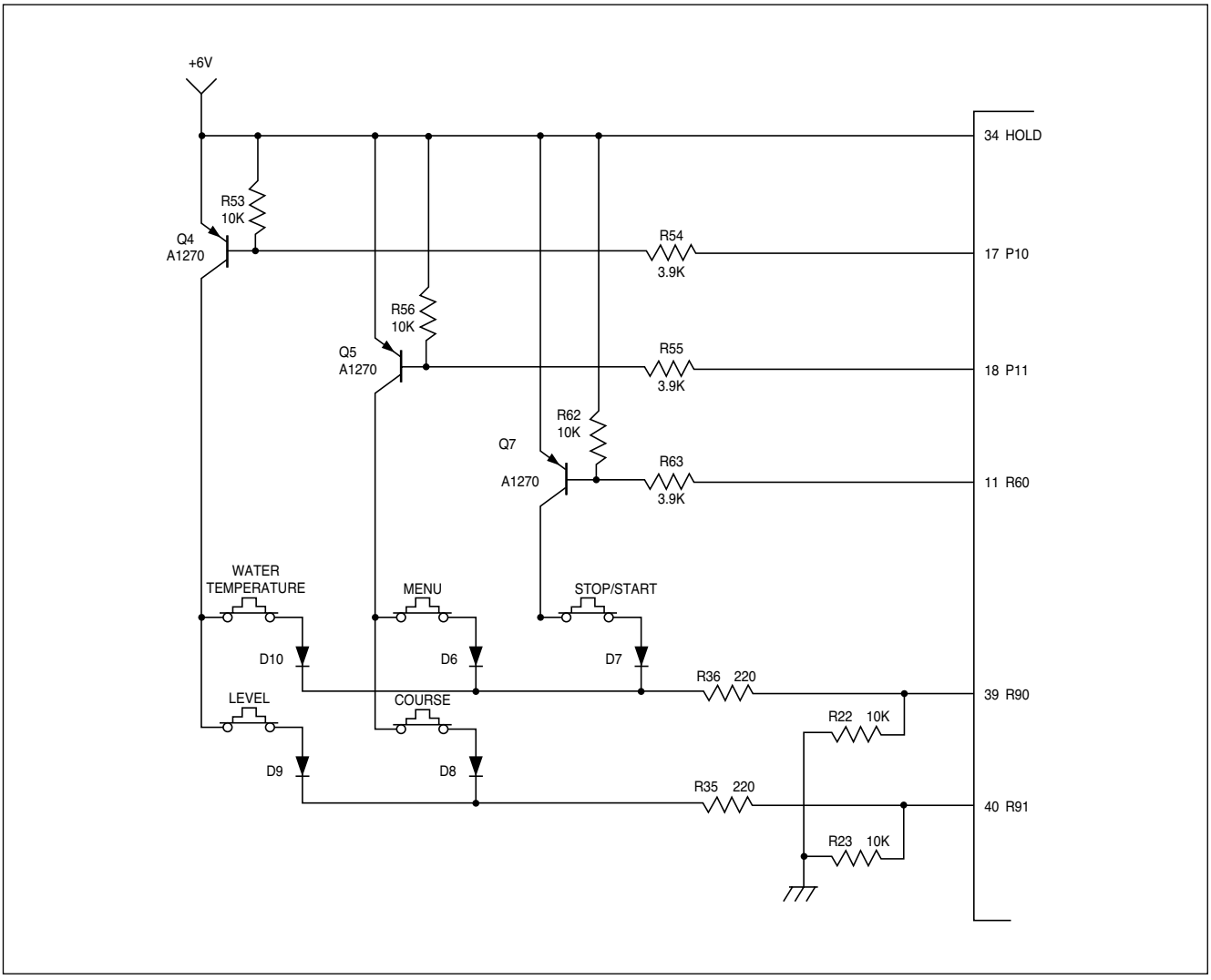
1. CIRCUIT DIAGRAM



2. EXPLANATION OF CIRCUIT
   - After the button action and total process ends, BUZZER is active.
   - It is active directly with offering an output the frequency waveform of 2 KHz from the MICOM terminal NO. 20.

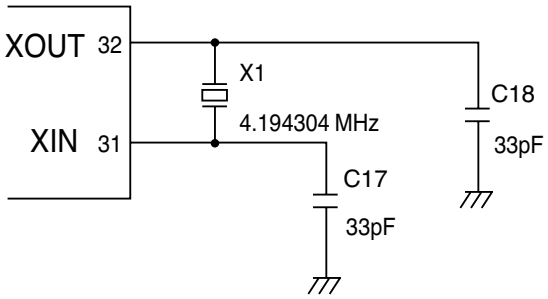
BUTTON INPUT UNIT

1. CIRCUIT DIAGRAM



OSCILLATION UNIT

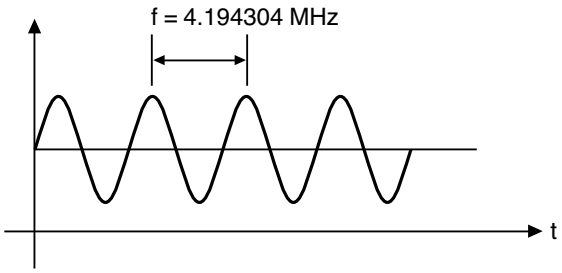
1. CIRCUIT DIAGRAM



2. EXPLANATION OF CIRCUIT

- As the OSCILLATION UNIT is a basic part of the MICOM DRIVE. If the oscillation doesn't generate, we are able to consider that the MICOM is destroyed.

- The waveform between the part of ① and the GND.



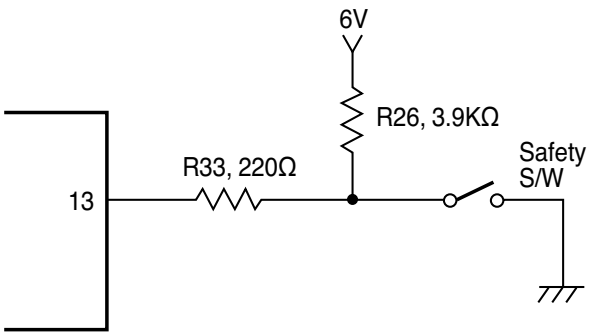
- Specification of oscillator

It is in general use for the MICOM maker's recommendatory value of condenser which is fit for MICOM's characteristics.

TYPE OF OSCILLATOR	MAKER	RATING FREQUENCY	CONDENSER	
			C17	C18
CRYSTAL OSCILLATOR	SUNNY	4.194304MHz	33pF	33pF

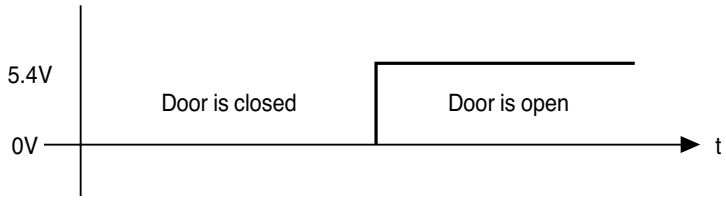
SAFETY SWITCH UNIT

1. CIRCUIT DIAGRAM



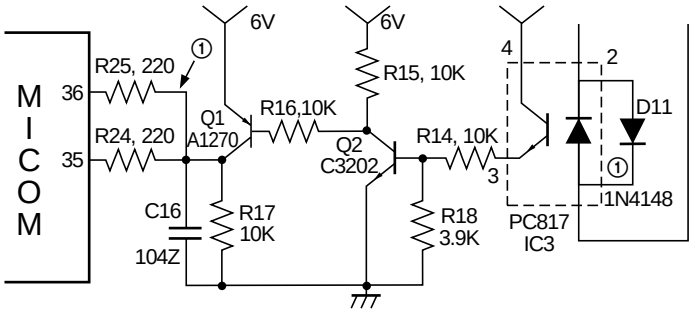
2. EXPLANATION OF CIRCUIT
- The MICOM terminal No. 13 gets into 'L' at the state of the closed door. If the door is opened in spining stage, the MICOM generates error signal. (See page 27)
- Case of range 40 mSEC~300 mSEC in spining time: It is regarded that washing clothes should be inclined. Accordingly washing time increases 8 minutes and rinsing action takes place another one time. Case of above 400 mSEC: It is regarded that the door should be open. Therefore it is displayed as door open error. (See page 27)

3. CAUTION FOR A/S
- Be level with the ground.
- The UNBLANCE error occurs in case of not being level with the ground.
- The waveform between the MICOM terminal No. 13 and the GND.

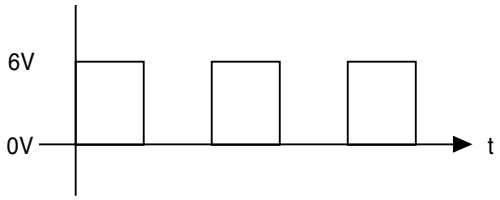


LOAD SENSOR UNIT

1. CIRCUIT DIAGRAM

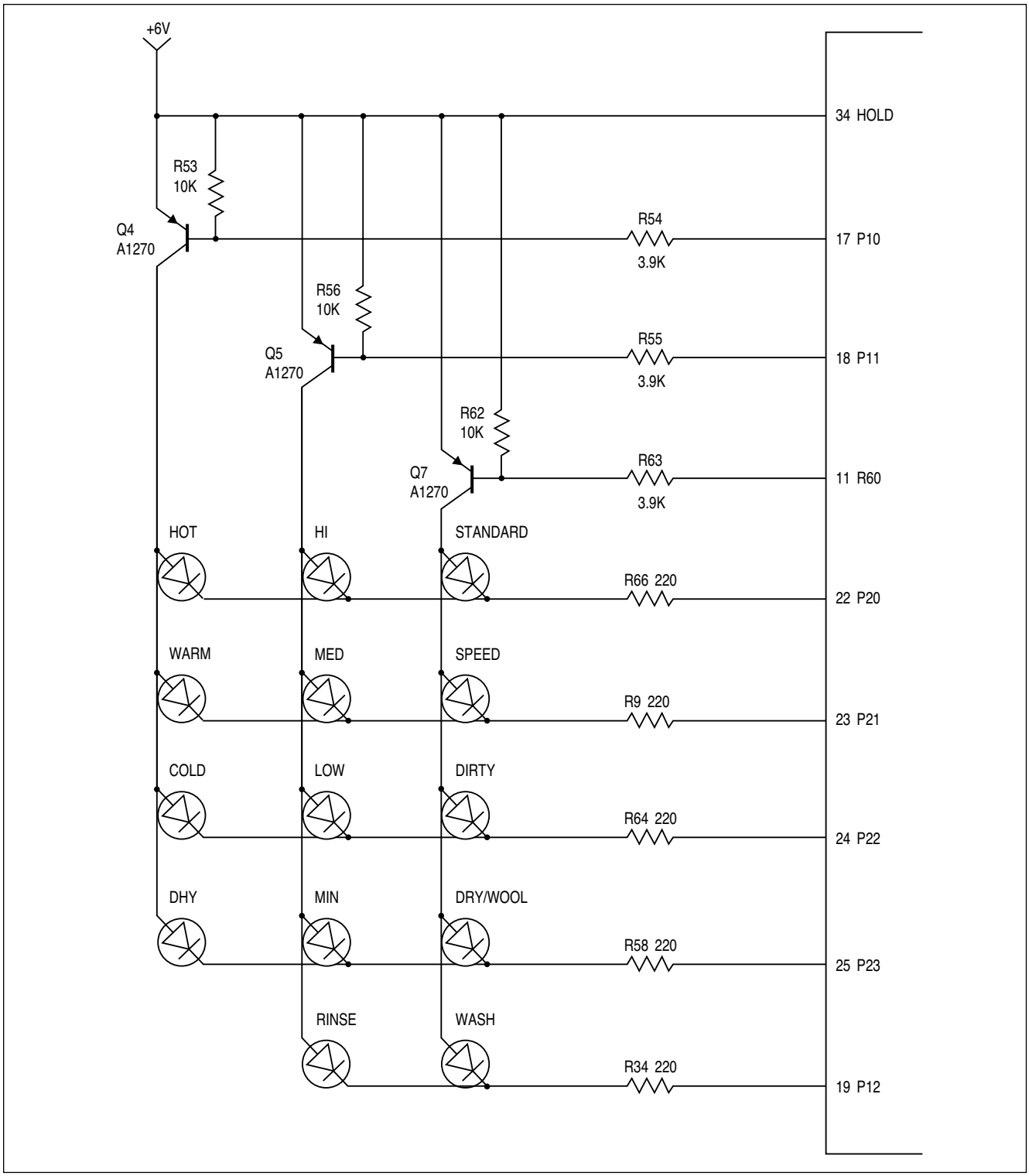


2. EXPLANATION OF CIRCUIT
- Detecting the voltage of running condenser, it sends the sensing data to the MICOM terminal No.35 & 36. That is, as charging & discharging time of running condenser becomes different according to the loads, in fuzzy course the washing time is determined by sensing the quantity of washing clothes.
- The waveform between the part of ① and the GND (waveform of pulse)



DISPLAY UNIT

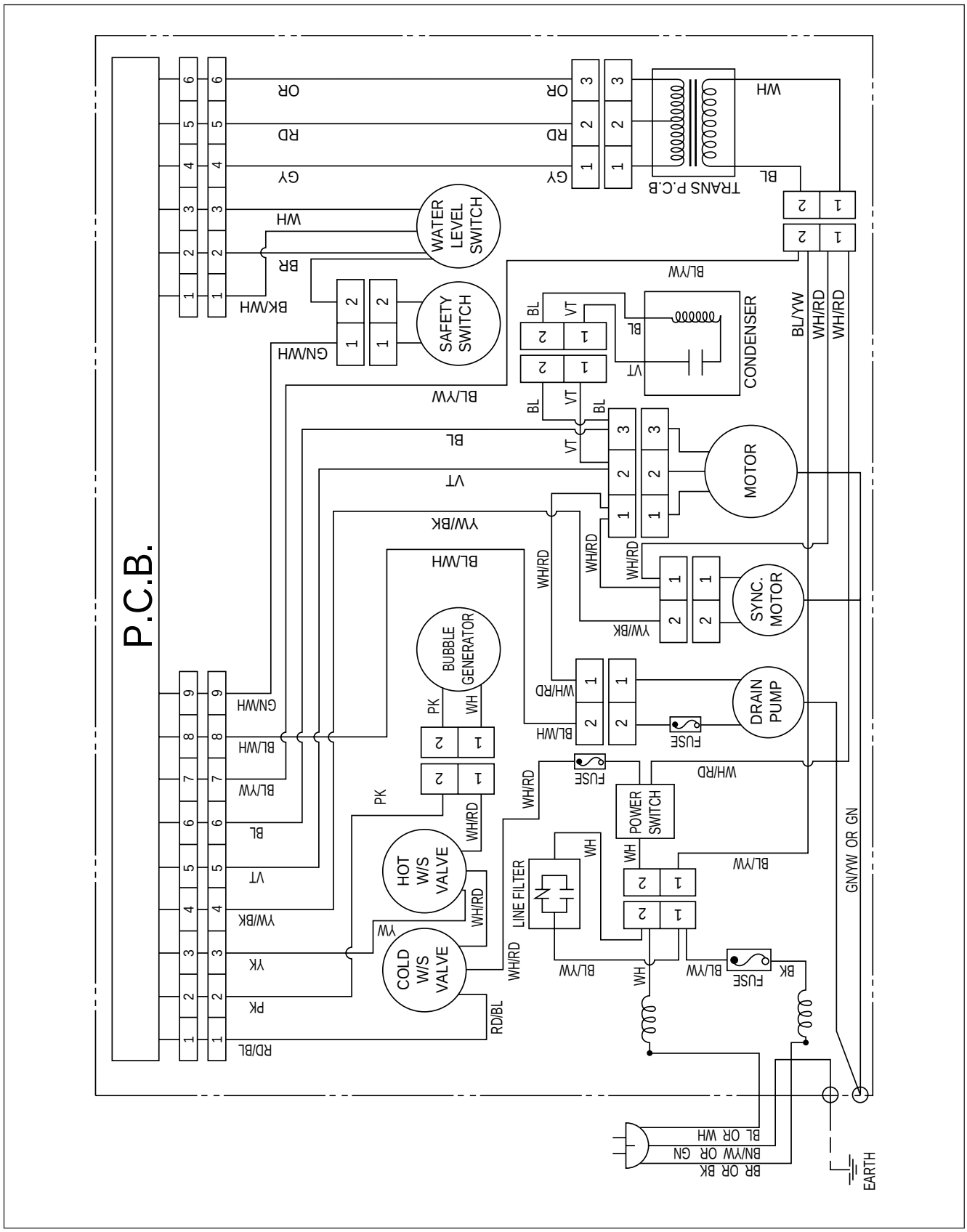
1. CIRCUIT DIAGRAM



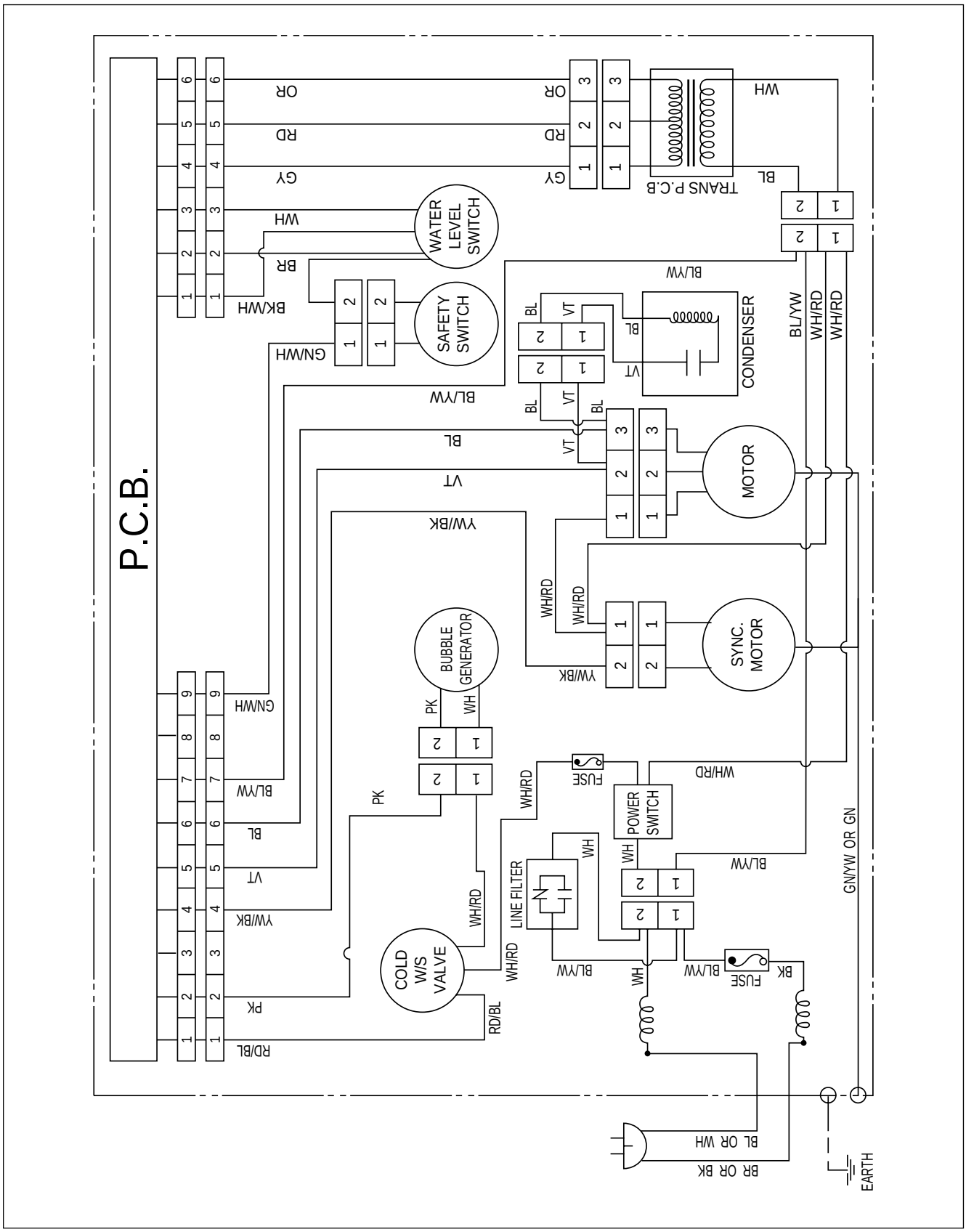
- When electric power source is turned on, the LED lamp is turned on necessarily corresponding to the standard course.

APPENDIX

WIRING DIAGRAM [PUMP]



WIRING DIAGRAM [NON-PUMP]



PART LIST

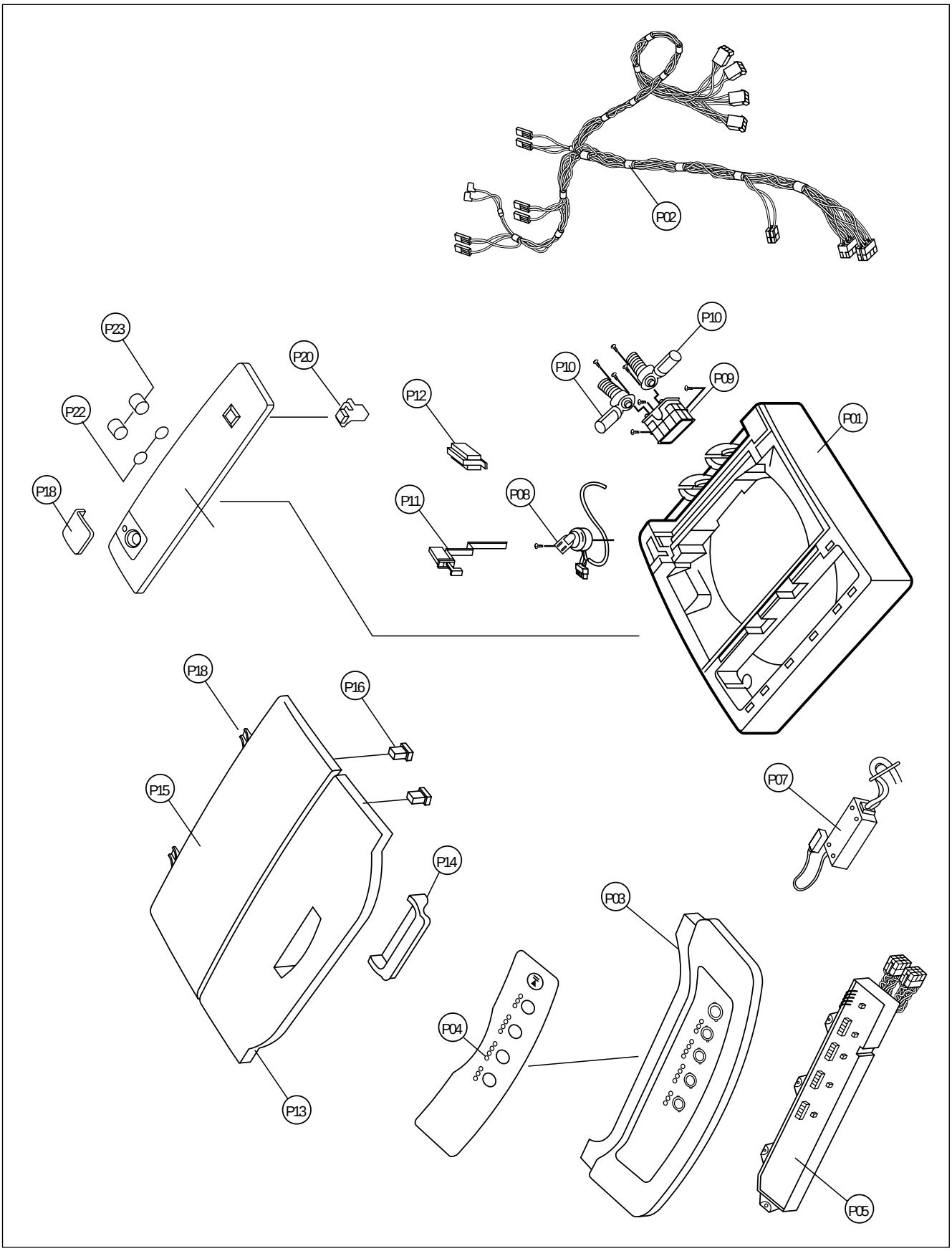
REF No.	PART CODE	PART NAME	DESCRIPTION	Q'TY	REMARK
ASS'Y PLATE					
P01	3614511900	PLATE T	HIPS	1	
P02	3612723300	HARNESS AS	AC 220V/50Hz, 60Hz	1	
	3612723310		AC 110V/50Hz, 60Hz		
	3612723340		AC 100V/50, 60Hz		
P03	3614213100	PANEL F	HIPS	1	
P04	3611609200	DECORATOR	PC FILM 0.254t	1	
P05	PRPSSWUU00	PCB ASS'Y	DWF-4220 (PUMP)	1	
	PRPSSWUV00		DWF-4220 (JE)		
	PRPSSWUW00		DWF-4220 (NON-PUMP)		
P06	3611524800	CUSHION (to PANEL F)	CR	1	
P07	36100B4040	ASS'Y PUMP BUBBLE	AC 220V/60Hz	1	option
	36100B4050		AC 100-130V/60Hz		
	36100B4030		AC 220-240V/50Hz		
P08	3614800100	SENSOR PRESSURE	DCSV PS-D6	1	
P09	3610402000	BODY INLET	FRPP (HOT, COLD)	1	
	3610402010		FRPP (COLD)		
P10	3615402010	VALVE INLET (COLD)	AC 220V/60Hz	1	Peru, etc
	3615403310		AC 110-120V/50, 60Hz		Japan
	3615403510		AC 110-130/60Hz		Taiwan
	3615403710		AC 220-240V/50Hz		Chile
	3615402130	VALVE INLET (HOT)	AC 220V/60Hz	1	Peru, etc
	3615403630		AC 110-130V/60Hz		Taiwan
	3615403830		AC 220-240V/50Hz		Chile
P11	3619006350	SWITCH SAFETY	DC 15V 10mA	1	
P12	5EPU061750	TRANS POWER	AC 230V/50Hz T2-V2	1	
	5EPU061770		AC 110V/50Hz T2-V1		
P13	3611712500	DOOR F	HIPS	1	
P14	3612602100	HANDLE DOOR	HIPS	1	
P15	3611712400	DOOR B	HIPS	1	
p16	3611523300	CUSHION DOOR	NBR	4	
P17	3612901900	HINGE DOOR	POM	2	
P18	3615106700	SPRING	SUS 304 D=1.6	1	
P19	3614213200	PANEL B	HIPS	1	
P20	3619008800	SWITCH POWER	125V/10A, 250V/5A 2P	1	
P21	3610905500	CAP PANEL B	HIPS	1	
P22	3612300100	GASKET (to VALVE INLET)	SILICON	2	
P23	4505E08050	CAP (to VALVE INLET)	PVC	2	

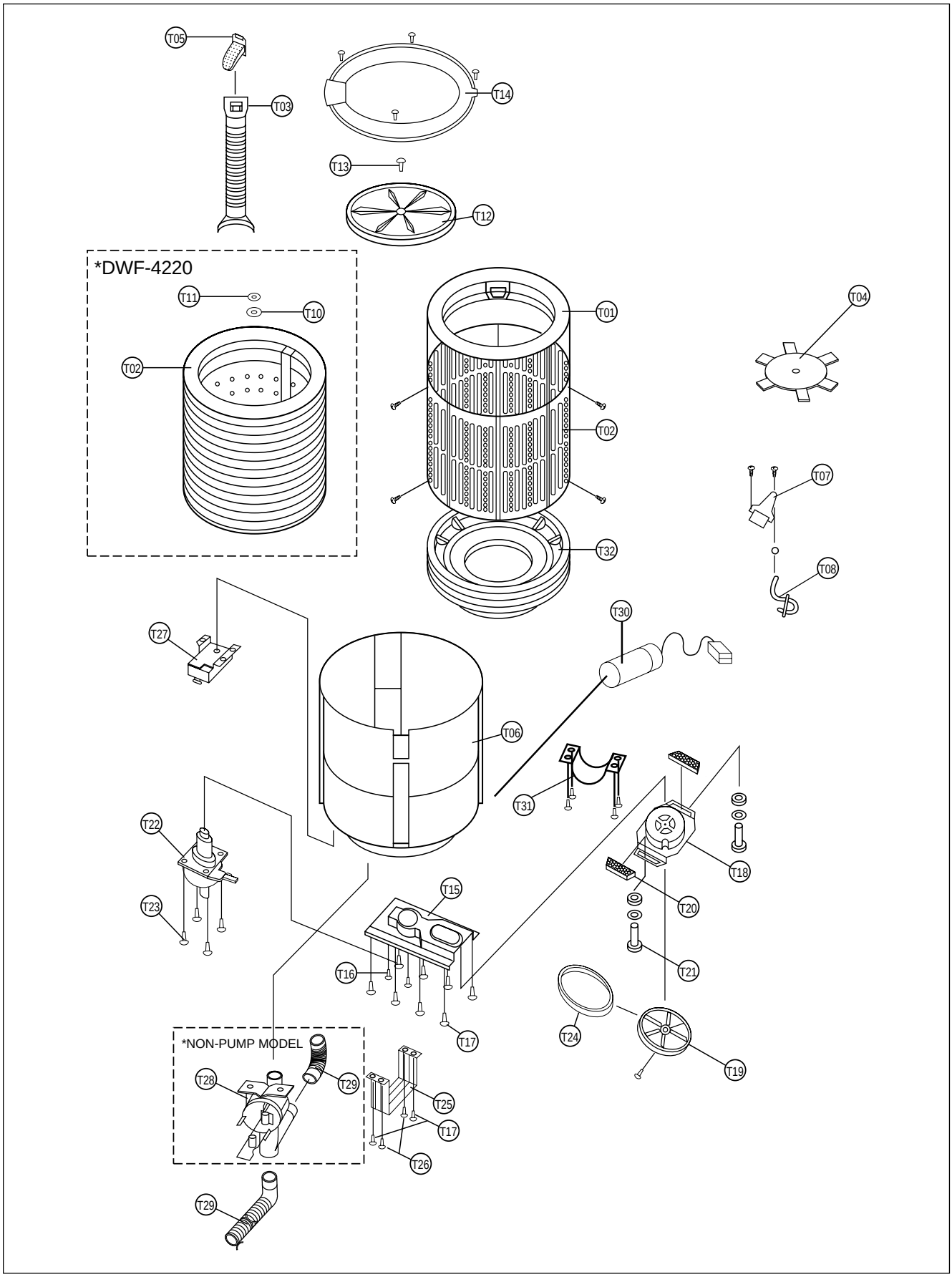
REF No.	PART CODE	PART NAME	DESCRIPTION	Q'TY	REMARK
ASS'Y TUB					
T01	3616102800	BALANCER AS	PP	1	DWF-4220
	3616003100		PP		DWF-5020
T02	3618803500	TUB I	PP	1	DWF-4220
	3618805400		YUS 430D 0.6t		DWF-5020
T32	3618805300	TUB U	PP	1	DWF-5020
T03	3612502500	GUIDE FILTER	PP	1	DWF-4220
	3612506310		PP		DWF-5020
T04	4505E05021	FLANGE TUB	ADC-10	1	
T05	3610085500	ASS'Y FILTER	PP (NYLON 74x130)	1	
T06	3618804000	TUB O	PP (PUMP, BUBBLE)	1	
	3618804100		PP (PUMP, NON-BUBBLE)		
	3618803400		PP (NON-PUMP, BUBBLE)		
	3618804200		PP (NON-PUMP, NON-BUBBLE)		
T07	4500D83100	NOZZLE AS	BUBBLING AS	1	
T08	4500D08170	HOSE (to BUBBLE)	ID=8.0, OD=12	0.4	
T09	4500D08180	CLAMP	SWC	1	
T10	4509L83070	SPECIAL WASHER	SUS 304 T2.0 P144	1	
T11	4507D83080	SPECIAL NUT	SUS 340	1	
T12	3619702200	PULSATOR AS	PP	1	
T13	4505E32030	SC. PULSATOR FIX AS	6x2.5 SCREW + RING O	1	
T14	3611408300	COVER TUB	PP	1	
T15	3610302900	BASE	SECEN 1.6t	1	
T16	4505E83120	SCREW BASE FIX	SM 5x13	4	
T17	4505E83100	SPECIAL BOLT BASE	6.5x23	10	
T18	3964311030	MOTOR CONDENSER	220V/50Hz (PN, NE)	1	
	3964220710		110V/60Hz (PT, TE)		
	3964130110		100V/50, 60Hz (JE)		
	3964310430		240V/50Hz (PM, ME)		
	3964320710		220V/60Hz (PL, LE)		
	3964820710		120, 127V/60Hz (PA, PS, SE)		
T19	3618401420	ASS'Y PULLEY MOTOR	ADC-12 DP=53 (50Hz)		
	3618402800		ADC-12 DP=48.5 (60Hz)		
T20	4505E34030	SPECIAL WASHER	NYLON 6/6	2	
T21	7650802511	BOLT HEX (to MOTOR)	6B-1, 8x25, HS, MFZN	2	
T22	3617303800	GEAR MECHANISM	GM-4200 NTN	1	
T23	7640801611	BOLT HEX (to GEAR)	6B-1, 8x16, SW, MFZN	4	
T24	4507B34020	BELT V	M19.5	1	
T25	3618301300	PROTECTOR GEAR	SBHG 1.6t	1	

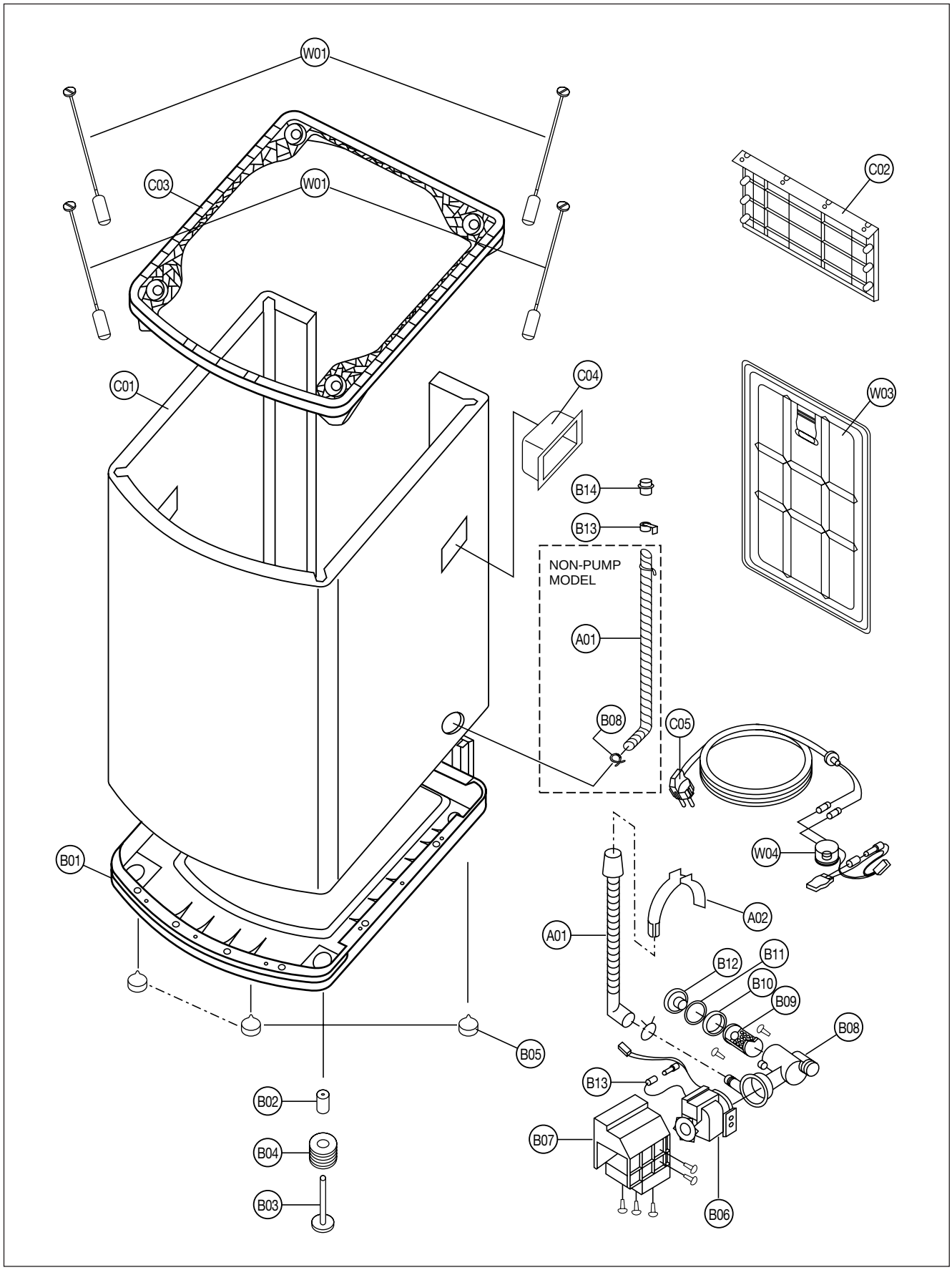
REF No.	PART CODE	PART NAME	DESCRIPTION	Q'TY	REMARK
T26	7640061611	BOLT HEX (to PROTECTOR)	6B-1, 6x16, SW, MFZN	2	
T27	3966130120	MOTOR SYNCHRONOUS	100V/50, 60Hz (JE)	1	
	450ED45020		110-130V/60Hz (PT/S/A)		
	3966010140		220-240V/50Hz (PN/M)		
T28	3615404000	VALVE DRAIN AS	NON-PUMP	1	
T29	3613215100	HOSE DRAIN I AS	PUMP	1	
	3613210300		NON-PUMP		
T30	3610032640	UNIT CAPACITOR AS	13.5µF+60µH (PL, LE)	1	
	3618909300		65µF+60µH (JE)		
	3610076140		54µF+60µH (PT, TE)		
	3610031940		12.5µF+60µH (PN, NE)		
	3610045640		11.4µF+60µF (PM, ME)		
	3610076240		41.6µF+60µF (PS, SE, PA)		
T31	3613004100	HOLDER CONDENSER	PP	1	
ASS'Y CABINET					
C01	3610804710	CABINET	SGCC 0.6t (PUMP)	1	
	361806100		SGCC 0.6t (NON-PUMP)		
C02	3614509900	PLATE UPPER	PP	1	
C03	3612201800	FRAME TOP	PP	1	
C04	3612601100	HANDLE CABINET	PP	1	
C05	3611301100	CORD POWER AS	3x1.0 300x2 300-RTM (PN)	1	
	WAK42H762-		A VCTFK 2x0.75 2.3m GY (PT)		
	WRJ42H261-		R VCTFK 2x0.75 2.3m GY (JE)		
C06	4505D81010	BUSHING CORD	SR 6P-4 or DA-6NR2 (PN)	1	
	3610701700		DA-6NF2 (JE)		
C07	3610068700	HARNESS OUTER	50/0.18 GREEN, ST710489-2	1	
ASS'Y BASE					
B01	3610307100	BASE U	PP (PUMP)	1	
	3610304200		PP (NON-PUMP)		
B02	3612000200	FIXTURE LEG	PPG	1	
B03	3617701500	LEG AS	PP	1	
B04	3613004300	HOLDER LEG	BUTYL RUBBER	1	
B05	4509D10020	FOOT	BUTYL RUBBER	3	
B06	3963513430	MOTOR SHADED POLE	220-240V/50Hz (PN, PM)	1	
	3963220330		110V/60HZ (PT)		
	36189		120V/60Hz (PA, PS)		
	3963322730		220V/60Hz (PL)		
B07	3611405301	COVER PUMP	UL/CSA (466FWU)	1	
B08	3611109700	CASE FILTER	FRPP	1	

REF No.	PART CODE	PART NAME	DESCRIPTION	Q'TY	REMARK
B09	3611901800	FILTER LINT	P.P (5-150)	1	
B10	3614002000	PACKING	NBR	1	
B11	3616004300	SPECIAL WASHER	P.C SHEET	1	
B12	3610903800	CAP FILTER	P.P (J-150)	1	
B13	3618703770	TERMINAL PUMP	CONNECTOR	1	PN/PL
	3618703720		CONNECTOR+FUSE		PT
ASS'Y WASHING MACHINE					
W01	3619801600	SUSPENSION AS	DWF-4200 SERIES (Front)	2	
W02	3619801610	SUSPENSION AS	DWF-4200 SERIES (Back)	2	
W03	3611411800	COVER BACK	PP (PUMP)	1	
	3611404400		PP (NON-PUMP)		
W04	3618903300	UNIT FUSE FILTER	250V 4A (PN, NE)	1	
	3618903360		125V 8A (PT, TE, JE)		
ASS'Y ACCESSORY					
A01	3613203101	HOSE AS	PUMP	1	
	3613209200	HOSE DRAIN O AS	NON-PUMP	1	
A02	3612502300	GUIDE DRAIN HOSE	PP (PUMP)	1	
A03	3611411900	COVER U	PP	1	For UL/CSA

PARTS DIAGRAM




T05
T03
T14
T13
T12
*DWF-4220
T11
T10
T02
T01
T02
T32
T04
T07
T08
T27
T30
T06
T31
T22
T23
T15
T16
T17
T18
T20
T21
T24
T19
*NON-PUMP MODEL
T28
T29
T25
T17
T26
T29


W01
C03
W01
C02
C01
C04
W03
B14
B13
NON-PUMP
MODEL
A01
B08
C05
B01
W04
A02
A01
B12
B11
B10
B09
B08
B05
B13
B02
B07
B04
B06
B03

P.C.B PARTS LIST

REF No.	PART CODE	PART NAME	DESCRIPTION	REMARK
R18	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R26	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R50	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R52	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R54	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R55	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R63	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R67	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R69	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R70	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R71	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R72	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R73	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R74	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R75	RD-4Z392JK	R CARBON FILM	1/4 3.9kΩ J	
R9	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R24	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R25	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R30	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R31	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R32	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R33	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R34	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R35	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R36	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R37	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R43	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R44	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R45	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R46	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R47	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R48	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R57	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R58	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R64	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R66	RD-4Z221JK	R CARBON FILM	1/4 220Ω J	
R13	RD-4Z331JK	R CARBON FILM	1/4 330Ω J	

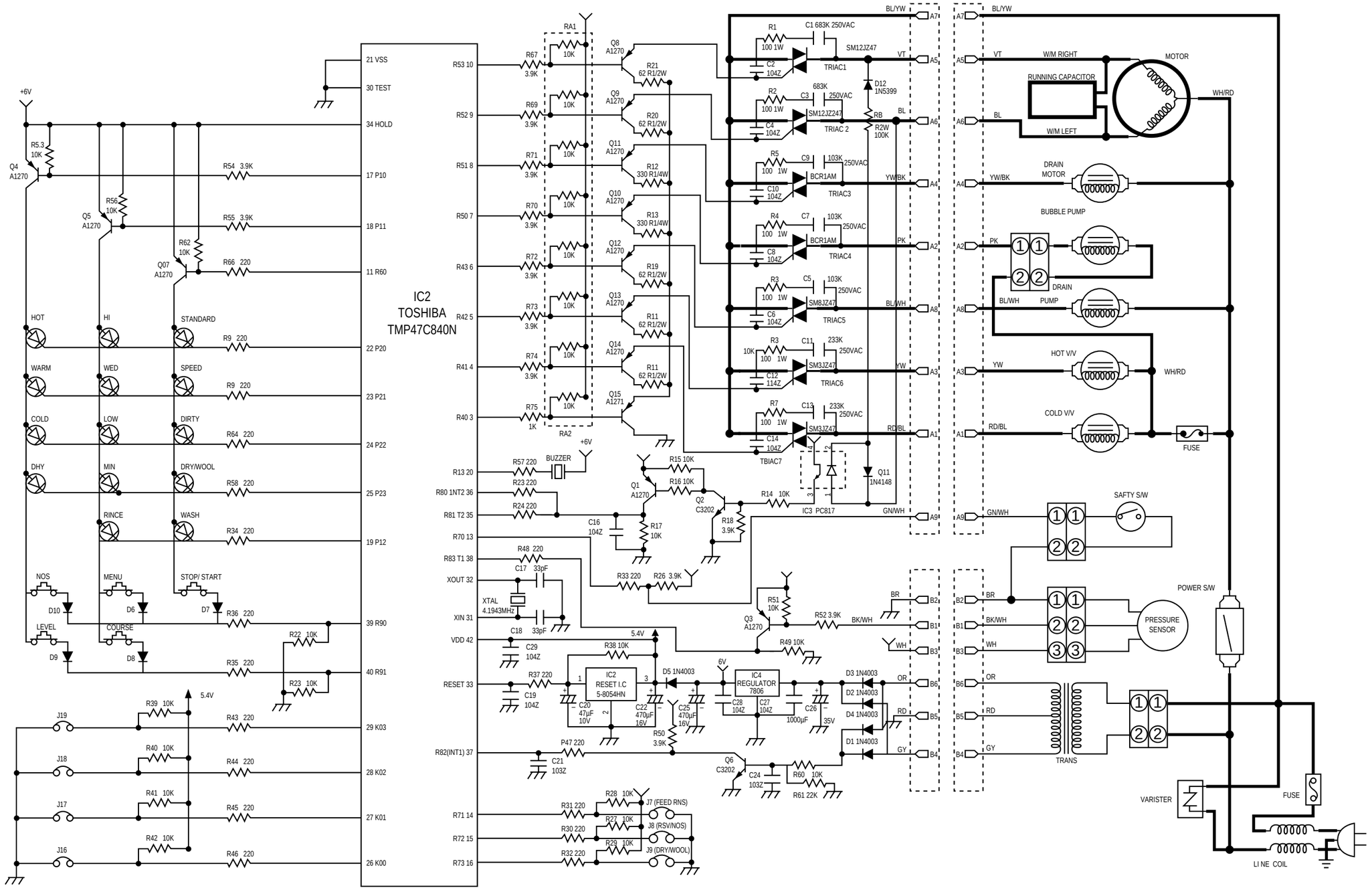
REF No.	PART CODE	PART NAME	DESCRIPTION	REMARK
R19	RD-4Z331JK	R CARBON FILM	1/4 330Ω J	
R61	RD-4Z223JK	R CARBON FILM	1/4 22kΩ J	
R14	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R15	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R16	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R17	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R22	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R23	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R27	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R28	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R29	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R38	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R39	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R40	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R41	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R42	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R49	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R51	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R53	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R56	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R60	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R62	RD-4Z103JK	R CARBON FILM	1/4 10kΩ J	
R10	RD-2Y620J-	R CARBON FILM	1/2 62Ω J	
R11	RD-2Y620J-	R CARBON FILM	1/2 62Ω J	
R12	RD-2Y620J-	R CARBON FILM	1/2 62Ω J	
R20	RD-2Y620J-	R CARBON FILM	1/2 62Ω J	
R21	RD-2Y620J-	R CARBON FILM	1/4 62Ω J	
R1	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R2	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R3	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R4	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R5	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R6	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R7	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
R8	RS01Y101J-	R M-OXIDE FILM	1W 100Ω J	
RA1	RA-85X103J	R ARRAY	5P (4) 1/8 10kΩ J	
RA2	RA-85X103J	R ARRAY	5P (4) 1/8 10kΩ J	
C21	CCZF1E103Z	C CERA	25V 0.01μF Z AXL 2	

REF No.	PART CODE	PART NAME	DESCRIPTION	REMARK
C24	CCZF1E103Z	C CERA	25V 0.01µF Z AXL 2	
C2	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C4	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C6	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C8	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C10	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C12	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C14	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C19	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C27	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C29	CCKF1H104Z	C CERA	HIKF 50V 0.1µF Z AXL 2	
C17	CXCH1H330J	C CERA	50V CH 33pF J (TAPPING)	
C18	CXCH1H330J	C CERA	50V CH 33pF J (TAPPING)	
C20	CEXE1C470A	C ELECTRO	16V RS 47µF 6.3x11	
C22	CEYE1C102A	C ELECTRO	16V RS 1000µF 13x20	
C25	CEXE1C471A	C ELECTRO	16V RS 470µF 10x20	
C26	CEXF1V102A	C ELECTRO	35V RSS 1000µF 13x25	
C1	CMXB2E683J	C MYLAR	EU 250V 0.068µF J	
C3	CMXB2E683J	C MYLAR	EU 250V 0.068µF J	
C5	CMXB2X103J	C MYLAR	EU 600V 0.01µF J	
C7	CMXB2X103J	C MYLAR	EU 600V 0.01µF J	
C9	CMXB2X103J	C MYLAR	EU 600V 0.01µF J	
C11	CMXB2X223J	C MYLAR	AC 250V 0.022µF J	
C13	CMXB2X223J	C MYLAR	AC 250V 0.022µF J	
D1	DKN4003A--	DIODE	KN4003A AUTO 26mm	
D2	DKN4003A--	DIODE	KN4003A AUTO 26mm	
D3	DKN4003A--	DIODE	KN4003A AUTO 26mm	
D4	DKN4003A--	DIODE	KN4003A AUTO 26mm	
D5	DKN4003A--	DIODE	KN4003A AUTO 26mm	
D6	DKN4148---	DIODE	KN4148 AUTO 26mm	
D7	DKN4148---	DIODE	KN4148 AUTO 26mm	
D8	DKN4148---	DIODE	KN4148 AUTO 26mm	
D9	DKN4148---	DIODE	KN4148 AUTO 26mm	
D10	DKN4148---	DIODE	KN4148 AUTO 26mm	
D11	DKN4148---	DIODE	KN4148 AUTO 26mm	
D12	D1N5399---	DIODE	1N5399	
Q15	TZTA1271Y-	TR	KTA1271Y (AUTO)	
Q1	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	

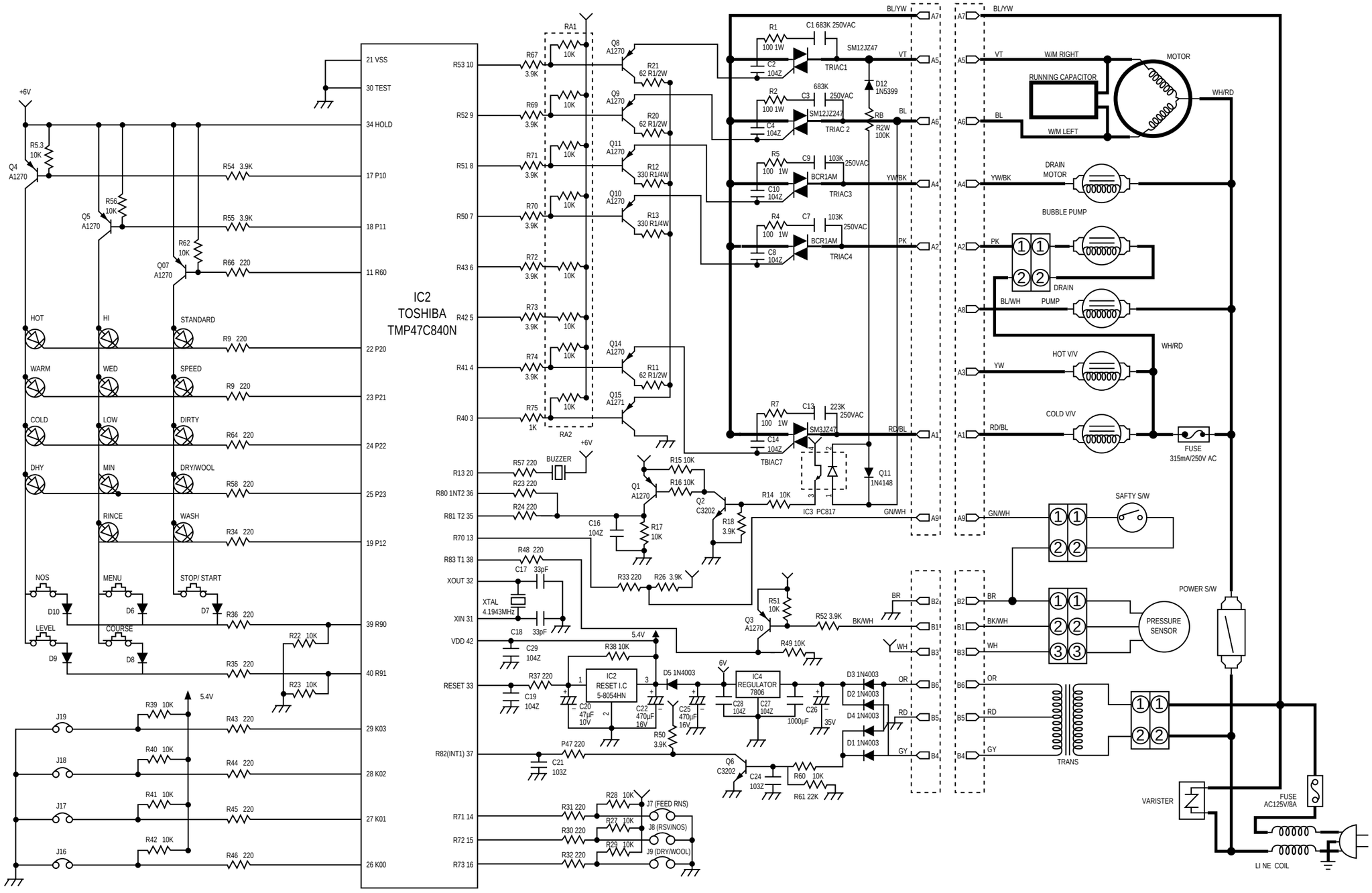
REF No.	PART CODE	PART NAME	DESCRIPTION	REMARK
Q3	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q4	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q5	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q7	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q8	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q9	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q10	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q11	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q12	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q13	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q14	TZTA1270Y-	TR	KTA1270Y (AUTO) (562Y)	
Q2	TZTC3202Y-	TR	KTC3202Y (AUTO) (1959Y)	
Q6	TZTC3202Y-	TR	KTC3202Y (AUTO) (1959Y)	
CN1	3612723600	HARNESS AS	LP-09 (DWF-4220)	
CN2	3612723500	HARNESS AS	LP-06 (DWF-4220)	
HS1	4509D72050	HEAT SINK	REGULATER, 25x35x20	
HS2	3617400300	HEAT SINK	50x50 T=3 (DWF-6688AT)	
BUZZ1	4507B72160	BUZZER	WFB20-16PC	
IC1	13GR47C840	IC MICOM	TMP47C840N	
IC2	1S8054HNZ-	IC AUDIO RESET	S-8054HN	
IC3	TPC817C	PHOTO COUPLER	PC817C	
IC4	1L7806----	IC REGULATOR	L7806	
NUT	7391300311	NUT HEX	6N-1-3 MFZN	
SCREW	7001301011	SCREW MACHINE	PAN 3X10 MFZN	
TRC1	TSM12JZ47F	TRIAC TOSHIBA	12A, LEAD FORMING TYPE	
TRC2	TSM12JZ47F	TRIAC TOSHIBA	12A, LEAD FORMING TYPE	
TRC3	TBCR1AMAB	TRIAC	BCR1AM FORMING TYPE	
TRC4	TBCR1AMAB-	TRIAC	BCR1AM FORMING TYPE	
TRC5	TSM8JZ47F	TRIAC	8A INSULATION TYPE	
TRC6	TSM3JZ47F	TRIAC	3A INSULATION TYPE	
TRC7	TSM3JZ47F	TRIAC	3A INSULATION TYPE	
WAS	4507D72300	SPECIAL WASHER	REGULATOR TRIAC	
X-TAL	5P4R194304	CRISTAL OSCILATOR	4.194304 MHz	
LED1	DDLR523D--	LED-LAMP	DLR523D	
LED2	DDLR523D--	LED-LAMP	DLR523D	
LED3	DDLR523D--	LED-LAMP	DLR523D	
LED4	DDLR523D--	LED-LAMP	DLR523D	
LED5	DDLR523D--	LED-LAMP	DLR523D	

REF No.	PART CODE	PART NAME	DESCRIPTION	REMARK
LED6	DDLR523D--	LED-LAMP	DLR523D	
LED7	DDLR523D--	LED-LAMP	DLR523D	
LED8	DDLR523D--	LED-LAMP	DLR523D	
LED9	DDLR523D--	LED-LAMP	DLR523D	
LED10	DDLR523D--	LED-LAMP	DLR523D	
LED11	DDLR523D--	LED-LAMP	DLR523D	
LED12	DDLR523D--	LED-LAMP	DLR523D	
LED13	DDLR523D--	LED-LAMP	DLR523D	
LED14	DDLR523D--	LED-LAMP	DLR523D	
SW1	5S50101400	SW TACT	KQB-902 1C 1P	
SW2	5S50101400	SW TACT	KQB-902 1C 1P	
SW3	5S50101400	SW TACT	KQB-902 1C 1P	
SW4	5S50101400	SW TACT	KQB-902 1C 1P	
SW5	5S50101400	SW TACT	KQB-902 1C 1P	
HOLDER1	3613006300	HOLDER LED	DWF-4220	
HOLDER2	3613006300	HOLDER LED	DWF-4220	
HOLDER3	3613006300	HOLDER LED	DWF-4220	
HOLDER4	3613006300	HOLDER LED	DWF-4220	

CIRCUIT DIAGRAM [PUMP]

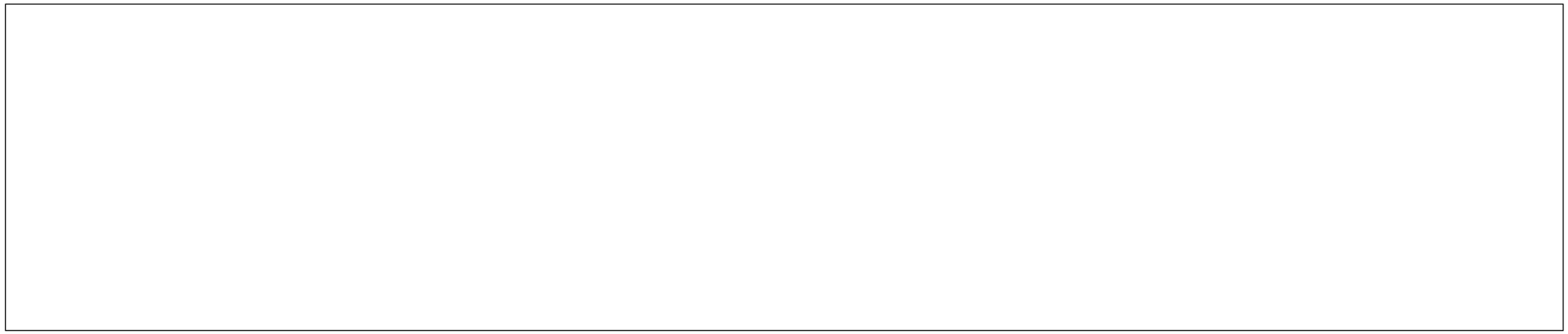


CIRCUIT DIAGRAM [NON-PUMP]



BARE PCB

TOP



BOTTOM